INC
JAA32651－R.3311.A

# AF-I Nikkor ED 300mm f/2.8 D IF

## REPAIR MANUAL

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Tokyo, Japan

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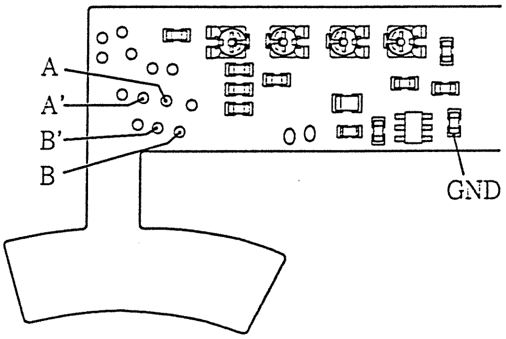
## AF-I Nikkor ED 300mm f／2.8 D

### Mistake

- A12 -



- A12 -

∘ Setting oscilloscope (reference values)

| | |
|---|---|
| VOLTS／DIV | 200mV |
| TIME／DIV | 0.5mS |

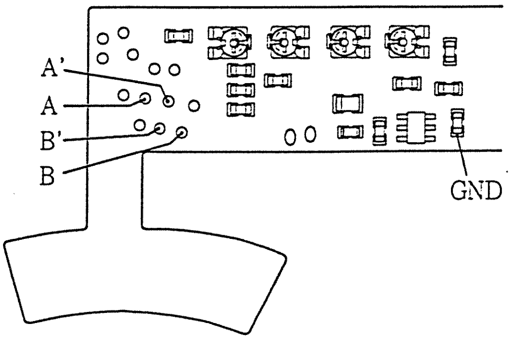
- A15 -

∘ Setting oscilloscope (reference values)

| | |
|---|---|
| VOLTS／DIV | 0.5V |
| TIME／DIV | 200mS |

### Correct

- A12 -



- A12 -

∘ Setting oscilloscope (reference values)

| | |
|---|---|
| VOLTS／DIV | 200mV |
| TIME／DIV | 1mS |

- A15 -

∘ Setting oscilloscope (reference values)

| | |
|---|---|
| VOLTS／DIV | 2 V |
| TIME／DIV | 1mS |

INC

# AF-I Nikkor ED 300mm f/2.8 D IF

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## 1. Specifications

### 1−1. Function

AF:Auto focus MF:Manual focus FA: Focus aid

| Lens | | Lens focus mode | | |
|---|---|---|---|---|
| Camera | Mode | M (MF) | M/A (MF OR AF) | A (AF) ) |
| F4 | C | FA operation is performed manually while pressing the shutter release button slightly.<br>* Shutter prerelease time is prolonged while operating the focusing ring. | ・AF operation is activated when the shutter release button is pressed lightly pressing.<br>・Press the shutter release button slightly and operate the focusing ring to change the focus mode from AF to MF, and turn the shutter prerelease timer OFF to change the focus mode from MF to AF.<br>・Press the shutter release button slightly and operate the focusing ring to change the focus mode from AF to MF. | AF operation is activated when the shutter release button is lightly pressing. |
| | S | | | |
| | M | | | |
| Other camera | C | FA operation is performed manually while pressing the shutter release button slightly. | AF and MF No operation | AF and MF NO operation |
| | S | | | |
| | M | | | |
| NON AF camera | | AF NO operation | -ditto- | -ditto- |

### 1−2. CPU contact

| Contact | Contacts | Contact | Contacts |
|---|---|---|---|
| A | VCC | G | Motor GND |
| B | R/W1 | H | Hotline, Pulse |
| C | Clock | I | Reserve |
| D | DATA | J | Reserve |
| E | Hotline, Pulse | Mount | GND |
| F | Power source for motor | | |

* Contacts are marked from "A" to "J" as viewed counter-clockwise from the rear of the lens (from the mount side).

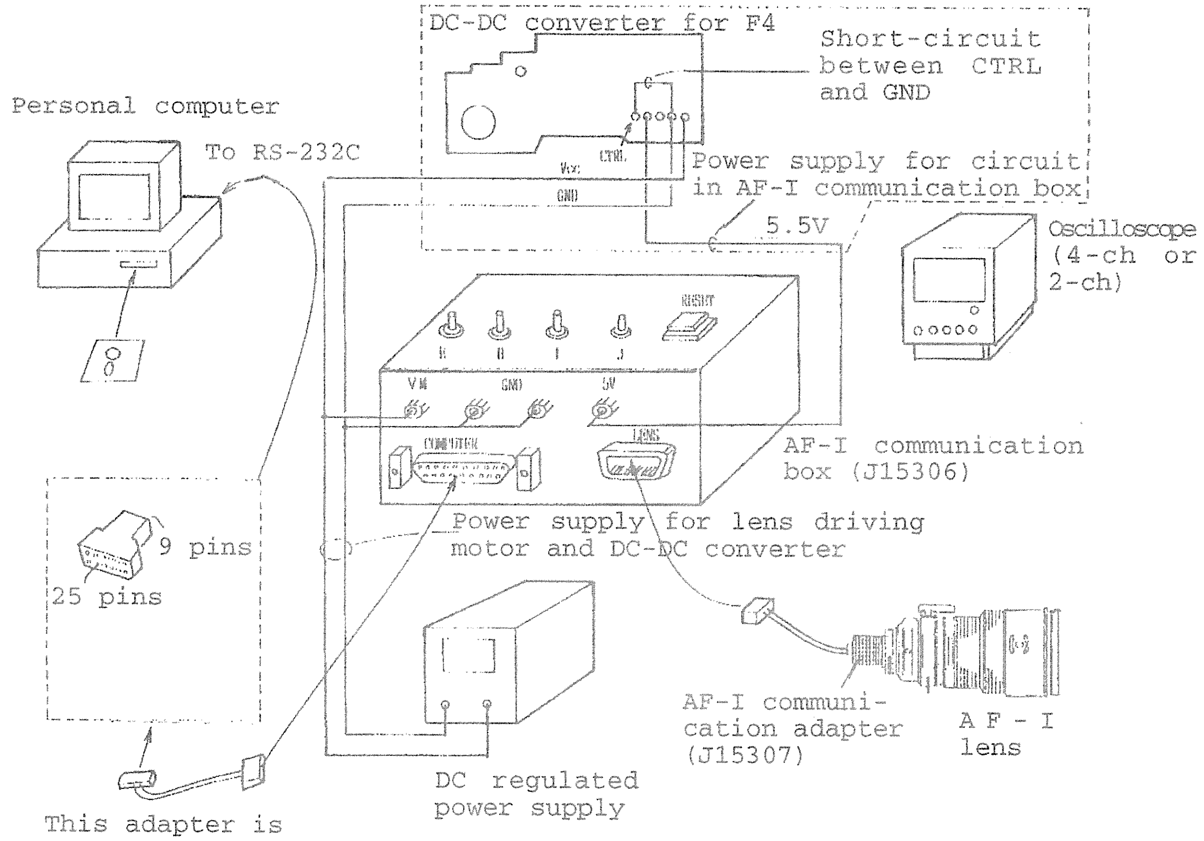
# 2. AF-I lens inspection and adjustment system

## 2-1 Outline

This system consists of AF-I lens inspection and adjustment software (J18231), AF-I lens communication adapter (J15307), AF-I communication box (J15306), personal computer, oscilloscope and DC-regulated power supply.
With this system, when making inspection and adjustment of an AF-I lens, you can monitor lens operation and condition and get a numerical readout on the computer screen by simulating the same conditions as when the AF-I lens is mounted on the actual camera body.
As a result, it is possible to check AF-I lens accuracy in various respects and to decide whether or not the lens is in good condition or is defective. Troubleshooting for the AF-I lens is now simpler and more effective.

System diagram

With DC-DC converter, one unit of DC regulated power supply can provide the system with enough power. The figure shows an example which uses DC-DC converter for F4 cameras. We will discuss on this matter in the following pages provided that we have modified as shown here.

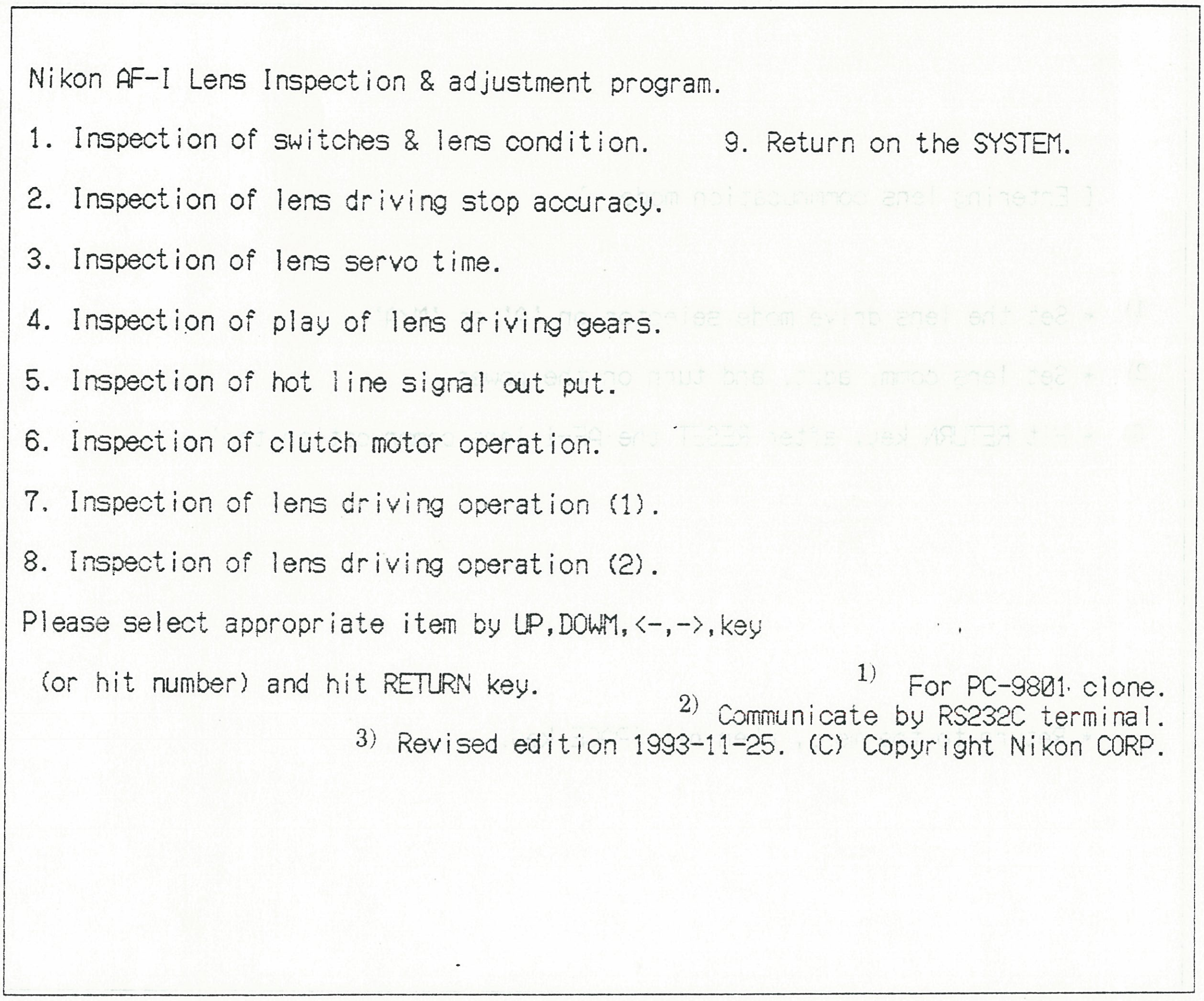

DC-DC converter for F4
Short-circuit between CTRL and GND
CTRL
Vcc
GND
Power supply for circuit in AF-I communication box
5.5V
Personal computer
To RS-232C
Oscilloscope (4-ch or 2-ch)
RESET
VM
GND
5V
COMPUTER
LENS
AF-I communication box (J15306)
9 pins
25 pins
Power supply for lens driving motor and DC-DC converter
AF-I communication adapter (J15307)
A F - I lens
DC regulated power supply

This adapter is necessary for a computer with 9-pin RS-232C terminal. RJ is not available.

サービス課
M

## 2-2 AF-I inspection and adjustment program

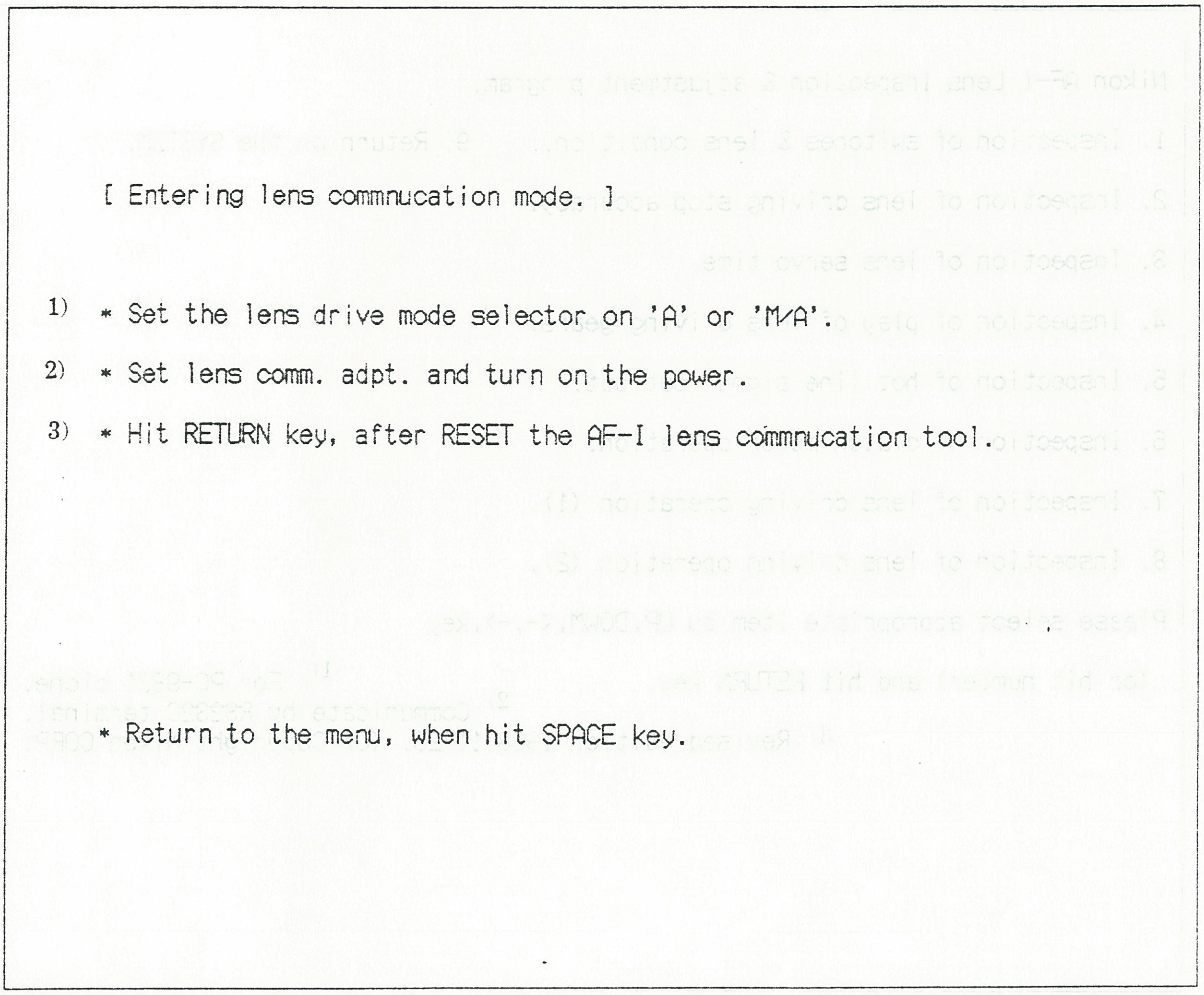
### (1) Menu screen



```
Nikon AF-I Lens Inspection & adjustment program.

1. Inspection of switches & lens condition.        9. Return on the SYSTEM.

2. Inspection of lens driving stop accuracy.

3. Inspection of lens servo time.

4. Inspection of play of lens driving gears.

5. Inspection of hot line signal out put.

6. Inspection of clutch motor operation.

7. Inspection of lens driving operation (1).

8. Inspection of lens driving operation (2).

Please select appropriate item by UP,DOWM,<-,->,key

 (or hit number) and hit RETURN key.                        1)  For PC-9801 clone.
                                                    2) Communicate by RS232C terminal.
                                  3) Revised edition 1993-11-25. (C) Copyright Nikon CORP.
```

1) Indicating the type of personal computers which can be used.
2) Indicating the interface with personal computers.
3) Indicating the software version number (revised date)

**(2) Entering lens communication mode screen**

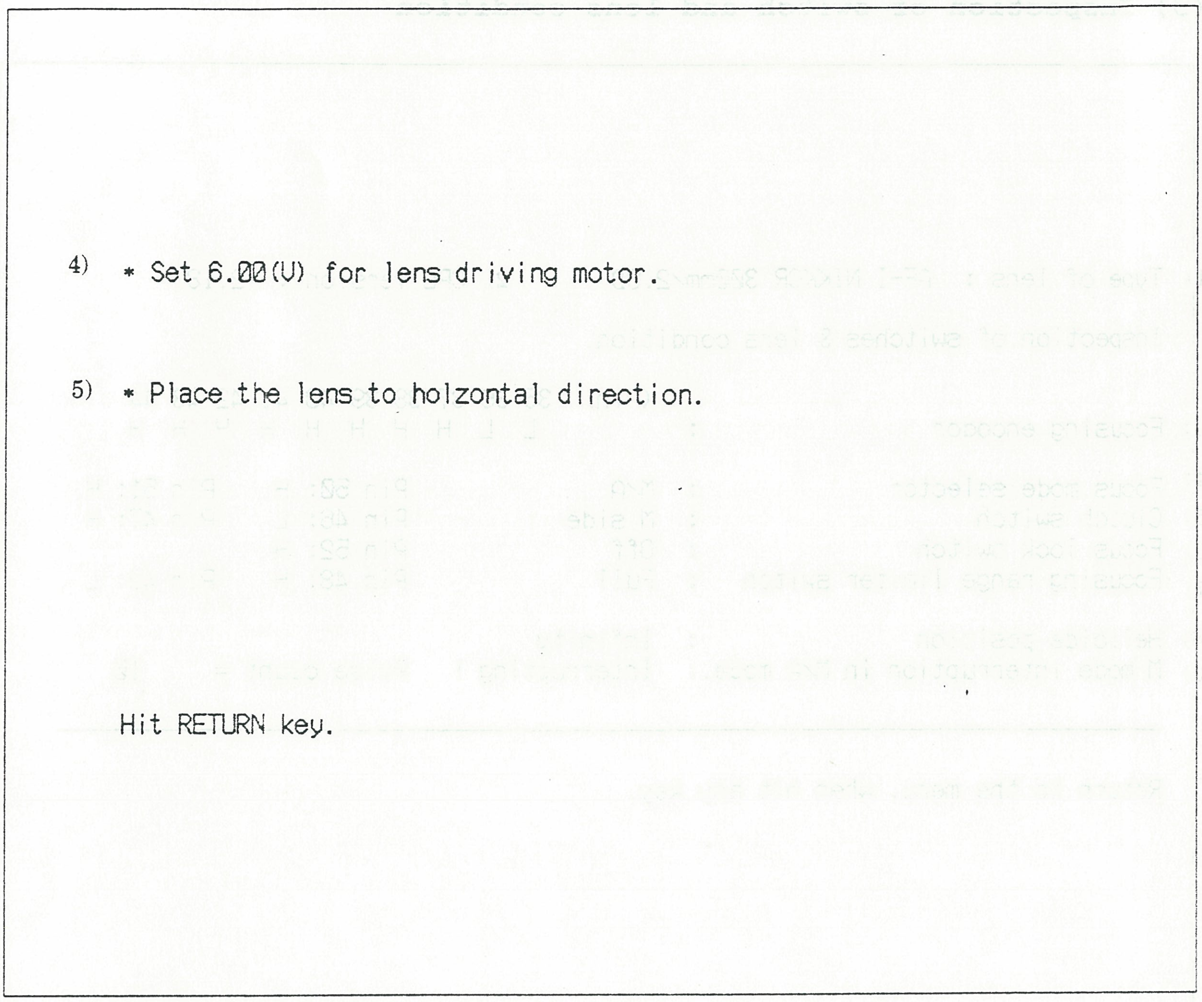


```
[ Entering lens commnucation mode. ]


1)  * Set the lens drive mode selector on 'A' or 'M/A'.

2)  * Set lens comm. adpt. and turn on the power.

3)  * Hit RETURN key, after RESET the AF-I lens commnucation tool.




    * Return to the menu, when hit SPACE key.
```

1) Prompt to set the AF-I lens drive mode selector.
2) Prompt to set the AF-I lens inspection and adjustment system (using oscilloscope when necessary) and to supply power from DC regulated power supply to the AF-I lens communication box. Supply voltage is normally set to 6.0V. The computer screen may prompt you to set the voltage to 6V as shown in the screen on next page.
3) Prompt to hit RETURN key after pressing the RESET key on the AF-I lens communication box.

計画課
M

計画課
M



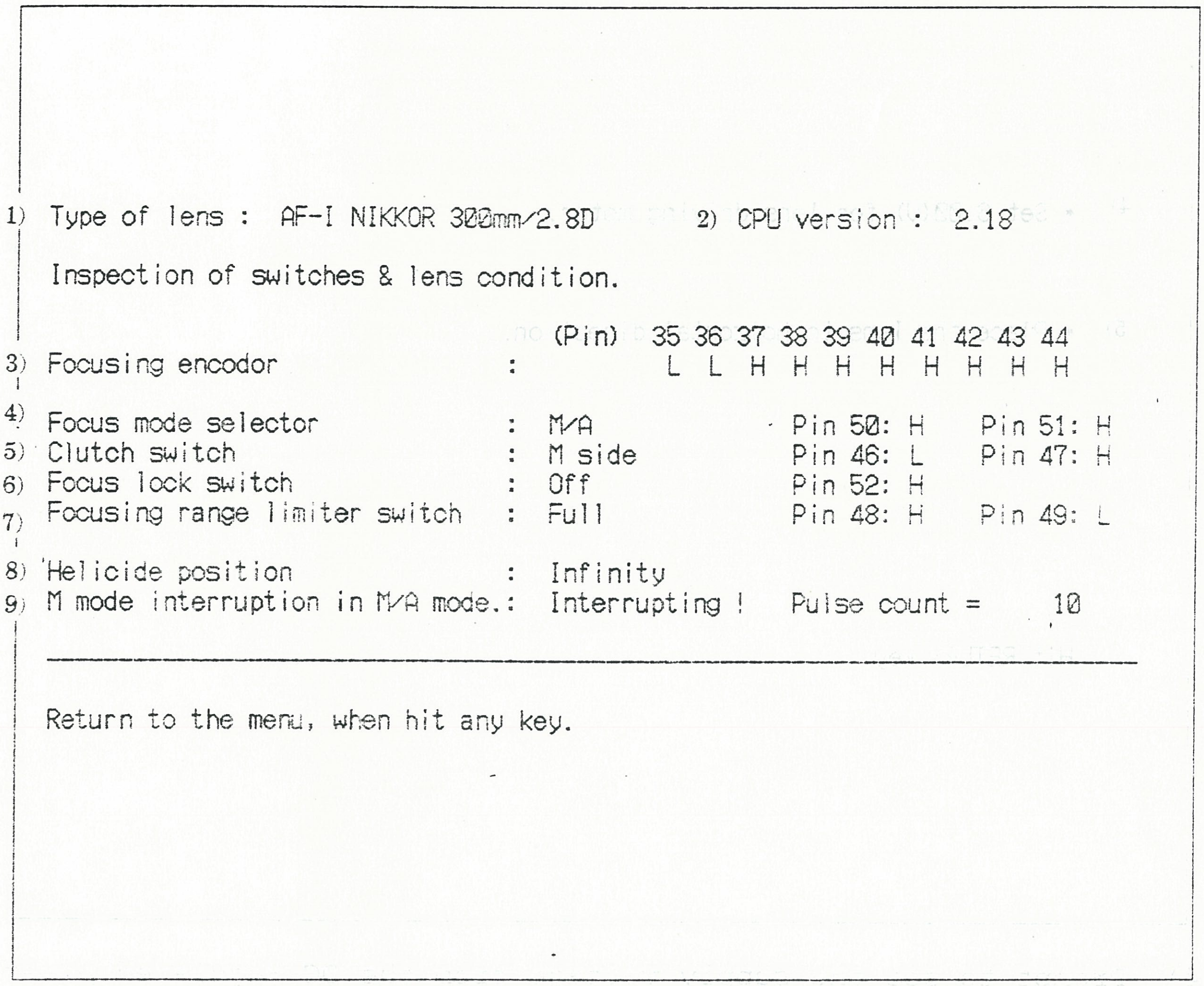
```
4)  * Set 6.00(V) for lens driving motor.


5)  * Place the lens to holzontal direction.




    Hit RETURN key.
```

4) Prompt to set the supply voltage from the DC-regulated power supply to the AF-I lens communication box.
5) Prompt to position the lens.
   Do not position the lens vertically as the helicoid will not move uniformly from close to infinity and infinity to close and, as a result, correct inspection becomes impossible.

計画課 M

計画課 M

## (3) Inspection of switch and lens condition



```
1) Type of lens :  AF-I NIKKOR 300mm/2.8D          2) CPU version :  2.18

   Inspection of switches & lens condition.

                                       (Pin)  35 36 37 38 39 40 41 42 43 44
3) Focusing encodor                   :          L  L  H  H  H  H  H  H  H  H

4) Focus mode selector                :  M/A              Pin 50: H    Pin 51: H
5) Clutch switch                      :  M side           Pin 46: L    Pin 47: H
6) Focus lock switch                  :  Off              Pin 52: H
7) Focusing range limiter switch      :  Full             Pin 48: H    Pin 49: L

8) Helicide position                  :  Infinity
9) M mode interruption in M/A mode.:  Interrupting !   Pulse count =      10
   -----------------------------------------------------------------------------

   Return to the menu, when hit any key.
```

1) Indicating the type of lens
2) Indicating the built-in CPU version number
3) You can monitor the change of distance encoder signals when turning the manual focus ring while setting the lens drive mode selector to M or M/A mode.
4) Monitoring the setting of the lens drive mode selector is possible.

| Setting of lens drive mode selector | Signal | |
|---|---|---|
| | Pin 50 | Pin 51 |
| M | H | L |
| M/A | H | H |
| A | L | H |

計画課
M

5) Monitoring the setting of clutch switch is possible.

| Setting of lens drive mode selector | Setting of clutch switch | Signal | |
|---|---|---|---|
| | | Pin 46 | Pin 47 |
| M | M side switch is ON. | L | H |
| M/A | Normally A side switch is ON. | H | L |
| | M side switch is ON when executing manual interruption. | L | H |
| A | A side switch is ON. | H | L |

6) Monitoring the setting of focus lock switch is possible.

| Setting of focus lock switch | Signal |
|---|---|
| | Pin 52 |
| Focus lock switch is OFF. | H |
| Focus lock switch is ON. | L |

7) Monitoring the setting of focus range limiter switch is possible.

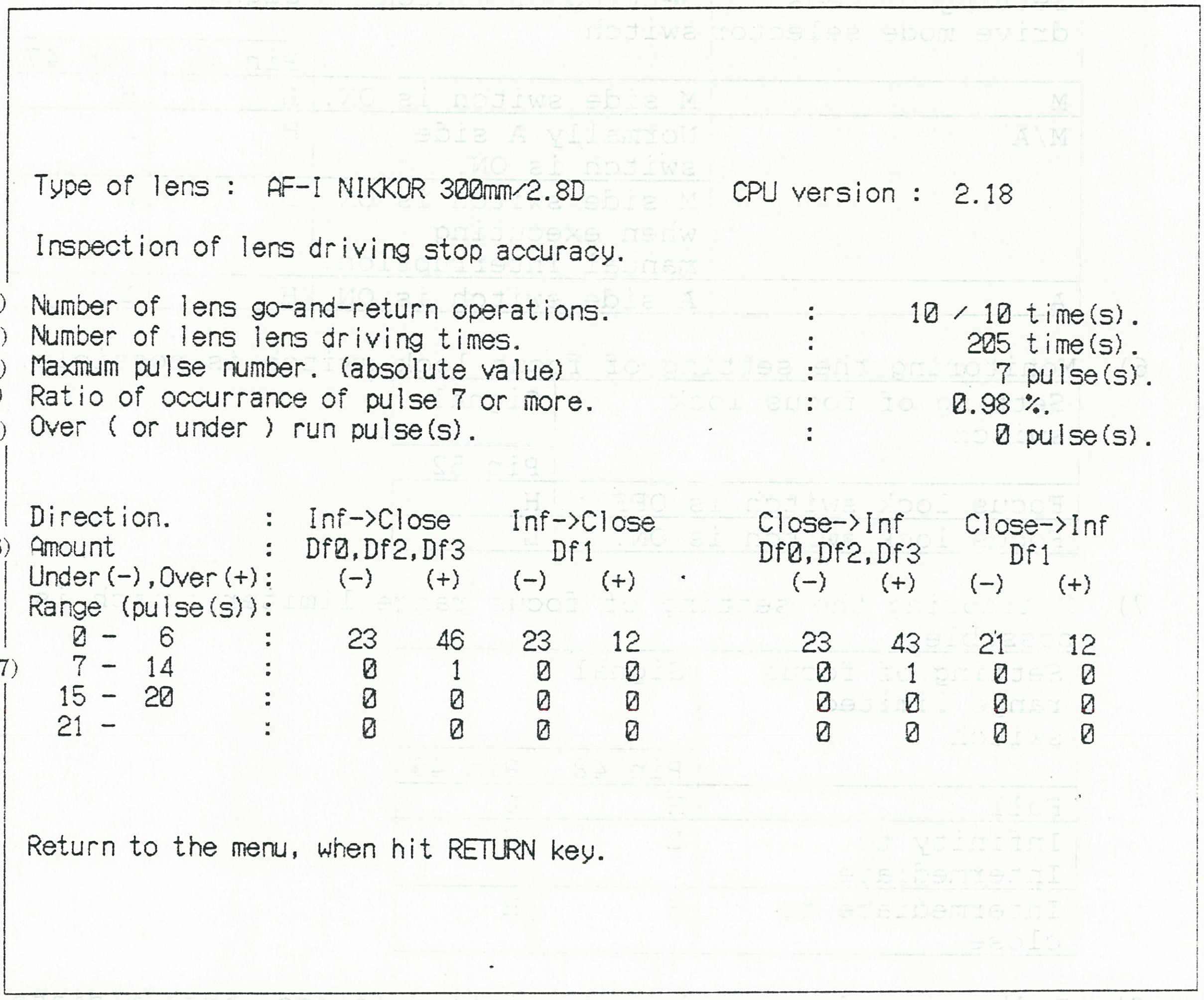
| Setting of focus range limited switch | Signal | |
|---|---|---|
| | Pin 48 | Pin 49 |
| Full | H | L |
| Infinity to Intermediate | L | H |
| Intermediate to close | H | H |

8) Indicating the position of helicoid (close, intermediate, infinity) based on the distance encoder signal.

9) When the lens drive mode selector is set to M/A mode, a pulse (M mode interruption recognition pulse) is output from the manual focus encoder when turning the manual focus ring. When the built-in CPU recognizes more than 2 pulses during a constant period, the lens drive mode is switched from auto focus to manual focus. We call this operation "interruption". This screen shows the number of pulses when interruption is executed in M mode.

計画課
M

### (4) Inspection of lens driving stop accuracy



```
   Type of lens :  AF-I NIKKOR 300mm/2.8D           CPU version :  2.18

   Inspection of lens driving stop accuracy.

1) Number of lens go-and-return operations.              :      10 / 10 time(s).
2) Number of lens lens driving times.                    :          205 time(s).
3) Maxmum pulse number. (absolute value)                 :            7 pulse(s).
4) Ratio of occurrance of pulse 7 or more.               :        0.98 %.
5) Over ( or under ) run pulse(s).                       :            0 pulse(s).

   Direction.        :  Inf->Close     Inf->Close      Close->Inf     Close->Inf
6) Amount            :  Df0,Df2,Df3       Df1          Df0,Df2,Df3       Df1
   Under(-),Over(+):     (-)    (+)    (-)    (+)      (-)    (+)    (-)    (+)
   Range (pulse(s)):
      0 -  6         :    23     46     23     12       23     43     21     12
7)    7 - 14         :     0      1      0      0        0      1      0      0
     15 - 20         :     0      0      0      0        0      0      0      0
     21 -            :     0      0      0      0        0      0      0      0

   Return to the menu, when hit RETURN key.
```

**Outline**

Measure the lens driving stop accuracy against the specified stop position and evaluate the lens driving stop accuracy by counting the number of overrun or underrun pulses. Be sure to set the voltage for lens driving motor to 6.5V.

1) Indicating the number of lens go-and-return operations.
2) Indicating the number of lens driving times.
3) Indicating the absolute value of the maximum numbers of overrun or underrun pulses against the specified stop position.
4) Indicating the ratio of occurrence of pulse 7 or more against the specified stop pulses.

   [(Number of occurrence of pulse 7 or more) / Number of lens driving times)] x 100 = Ratio of occurrence of pulse 7 or more (%).

計画課 M

5) Indicating the number of overrun or underrun pulses against the specified stop pulses.

6) Amount of lens servo and driving patterns

| Type | Amount of lens servo |
|---|---|
| Df0 | Varies in every go-and-return operation |
| Df1 | Fine driving |
| Df2 | Large driving |
| Df3 | Small driving |

Driving patterns

Infinity -> Df0 -> DF1 -> Df2
Repeat this operation up to the close end

Close -> Df0 -> Df3 -> Df1 -> Df2
Repeat this operation up to the infinity end

Repeat the above operations 10 times to measure the whole range of the helicoid.

7) Indicating the number of occurrence of overrun (or underrun) pulses for every occurrence range in the direction of lens servo at every amount (Df0, Df1, Df2, Df3).

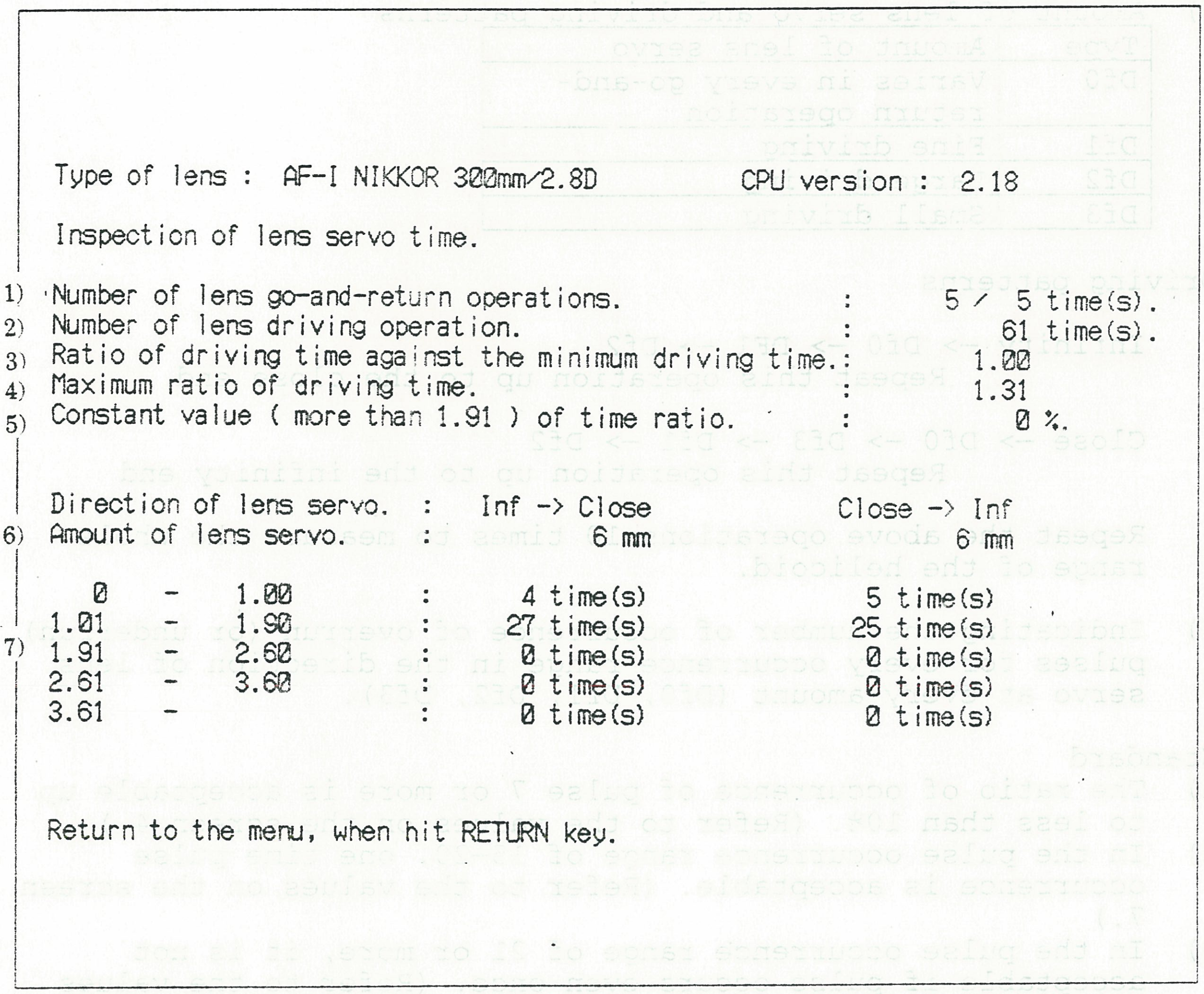
Standard

1) The ratio of occurrence of pulse 7 or more is acceptable up to less than 10%. (Refer to the values on the screen 4.)
2) In the pulse occurrence range of 15–20, one time pulse occurrence is acceptable. (Refer to the values on the screen 7.)
3) In the pulse occurrence range of 21 or more, it is not acceptable if pulse occurs even once. (Refer to the values on the screen 7.)

All values in the items 1) to 3) above should be within the range of standard values.

計画課
M

### (5) Inspection of lens servo time



```
    Type of lens :  AF-I NIKKOR 300mm/2.8D              CPU version :  2.18

    Inspection of lens servo time.

1)  Number of lens go-and-return operations.                 :        5 /  5 time(s).
2)  Number of lens driving operation.                        :            61 time(s).
3)  Ratio of driving time against the minimum driving time.:         1.00
4)  Maximum ratio of driving time.                           :         1.31
5)  Constant value ( more than 1.91 ) of time ratio.         :            0 %.

    Direction of lens servo.  :   Inf -> Close                Close -> Inf
6)  Amount of lens servo.     :           6 mm                   6 mm

       0    -    1.00         :      4 time(s)             5 time(s)
    1.01    -    1.90         :     27 time(s)            25 time(s)
7)  1.91    -    2.60         :      0 time(s)             0 time(s)
    2.61    -    3.60         :      0 time(s)             0 time(s)
    3.61    -                 :      0 time(s)             0 time(s)

    Return to the menu, when hit RETURN key.
```

**Outline**

Measure the time taken at a constant driving amount (Df12) and check to see if there is something abnormal in the servo driving. Be sure to set the voltage for the lens driving motor to 5.5V. The results will be displayed after repeating lens go-and-return operations five times.

1) Indicating the number of lens go-and-return operations.
2) Indicating the number of lens driving times.
3) Ratio of driving time for each measurement against the maximum time taken at driving amount Df12. The minimum driving time is set to 1.
4) Ratio of the maximum driving time until the next measurement against the minimum driving time taken at driving amount Df12.
5) Driving ratio is a driving time ratio against the minimum mean time* at driving amount Df12. Here shows the ratio of occurrence of pulse with the driving ratio of more than 1.91.
   *Mean value of 10 sampling data taken out of minimum driving times from smaller to larger ones.

計画課
M

6) Amount of lens servo and driving patterns

- Servo driving amount

| Type | Amount of lens servo |
|---|---|
| Df0 | Varies in every go-and-return operation |
| Df12 | Medium driving |

Note: Df10 is not displayed on the screen as it is not yet measured.

- Driving patterns

Infinity –> Df10 –> Df12 –> Df12 . . . . . .–> Close
Close –> Df10 –> Df12 –> Df12 . . . . . . –> Infinity
Repeat the above procedures five times covering the whole range of helicoid.

7) Indicating the number of occurrence of pulse for every driving ratio range at every amount Df12 in every direction of lens servo.

Standard

1) In the driving ratio range of under 1.90, any number of occurrence of pulse is acceptable. (Refer to the values on the screen 7.)

2) In the driving ratio range of over 1.90, less than 10% of occurrence of pulse is acceptable. (Refer to the values on the screen 5.)

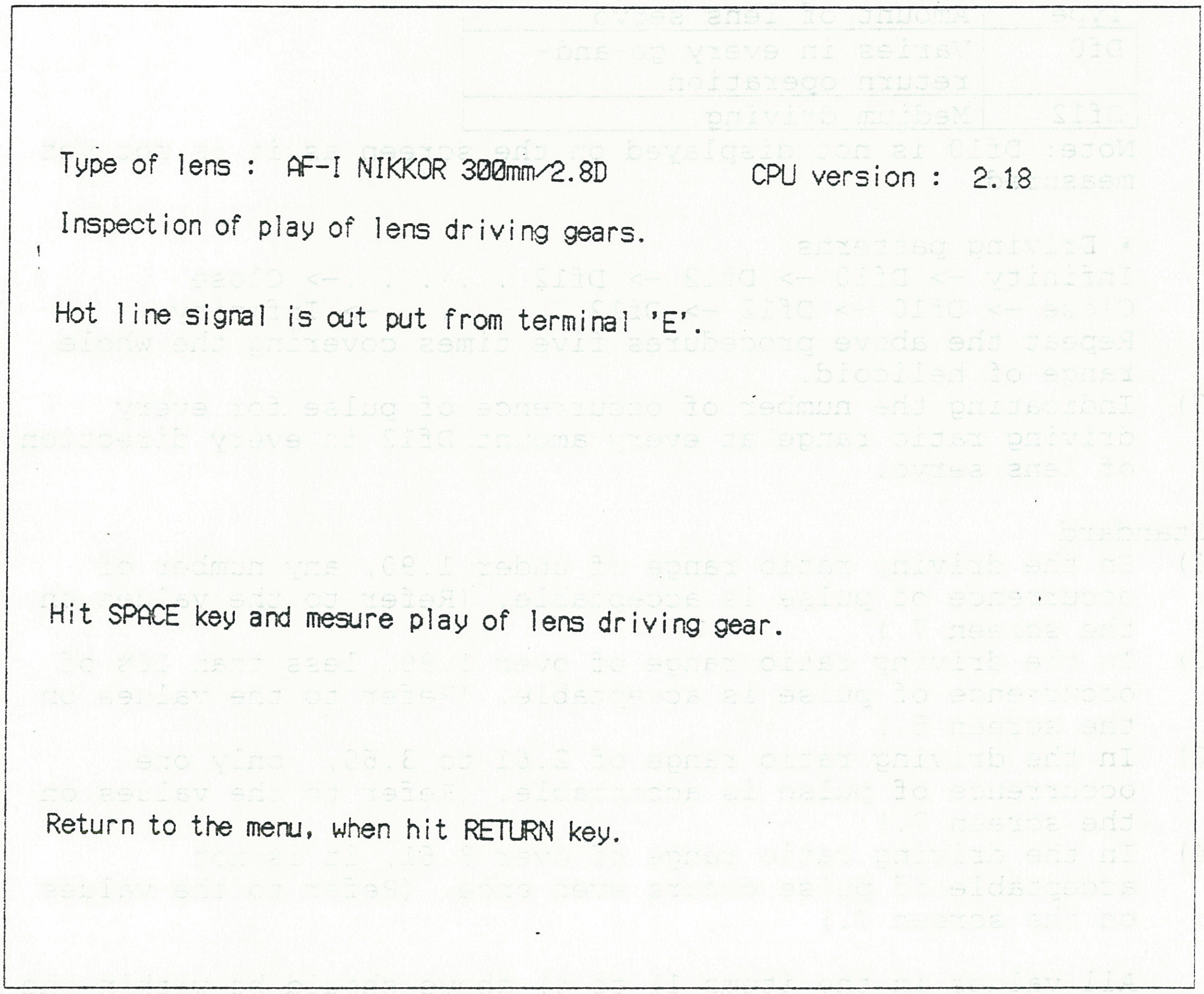
2) In the driving ratio range of 2.61 to 3.60, only one occurrence of pulse is acceptable. (Refer to the values on the screen 7.)

4) In the driving ratio range of over 3.61, it is not acceptable if pulse occurs even once. (Refer to the values on the screen 7.)

All values in the items 1) to 4) above should be within the range of standard values.

計画課 M

### (6) Inspection of play of lens driving gears



```
Type of lens :  AF-I NIKKOR 300mm/2.8D            CPU version :  2.18

Inspection of play of lens driving gears.


Hot line signal is out put from terminal 'E'.








Hit SPACE key and mesure play of lens driving gear.




Return to the menu, when hit RETURN key.
```

**Outline**

Delay time from the starting of rotation of AF motor (for driving lens) until the output of the hotline signal due to the play of lens driving gears. If this delay time becomes larger, AF accuracy is affected. Therefore it is necessary to check and confirm the amount of play by counting the output of AF motor pulse inspection PI pulses.

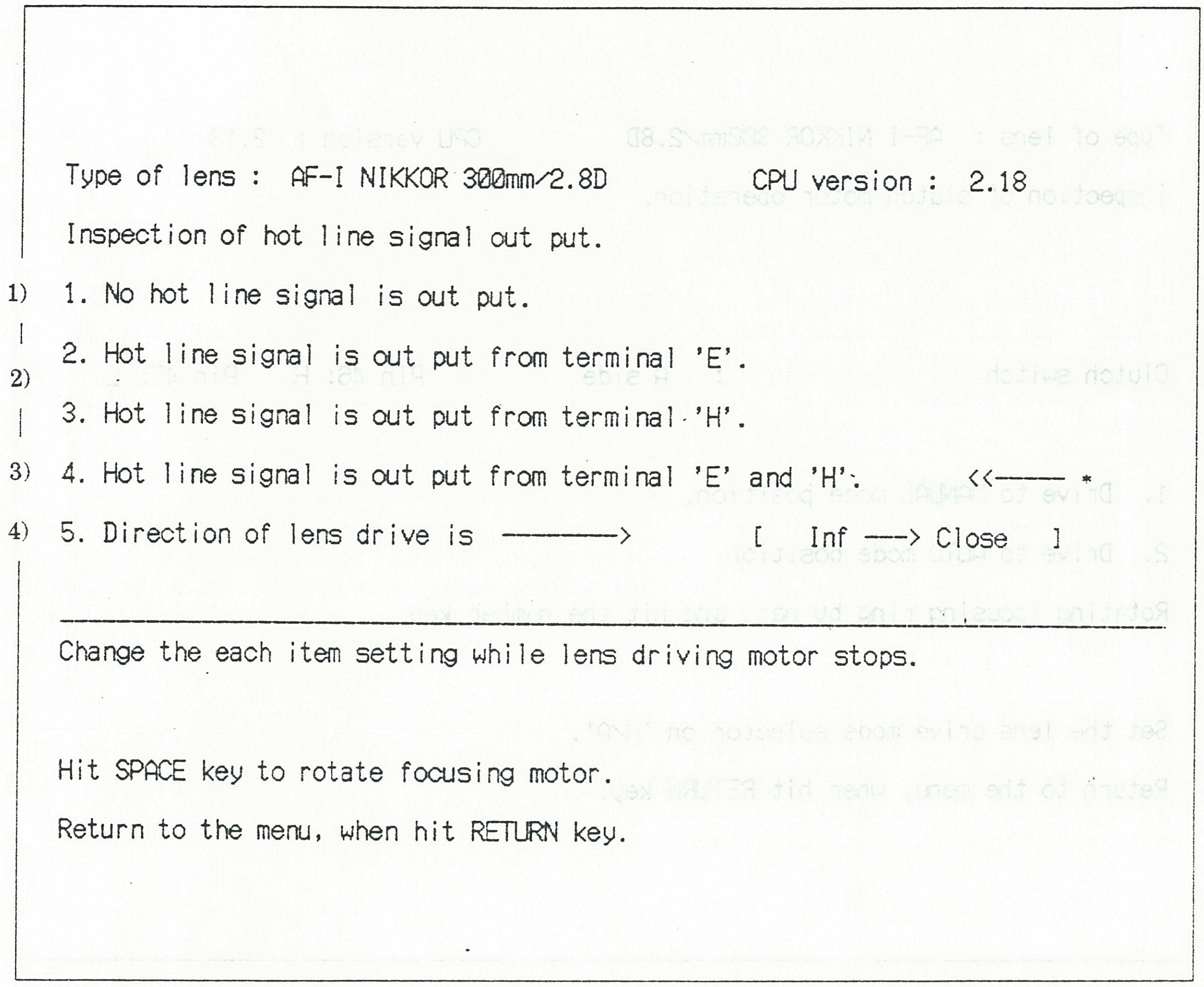
Count the output of the AF motor pulse inspection PI pulses from the starting of rotation of AF motor until the output of the hotline signal.

Standard

Within 10 pulses

計画課
M

## (7) Inspection of hot line signal output



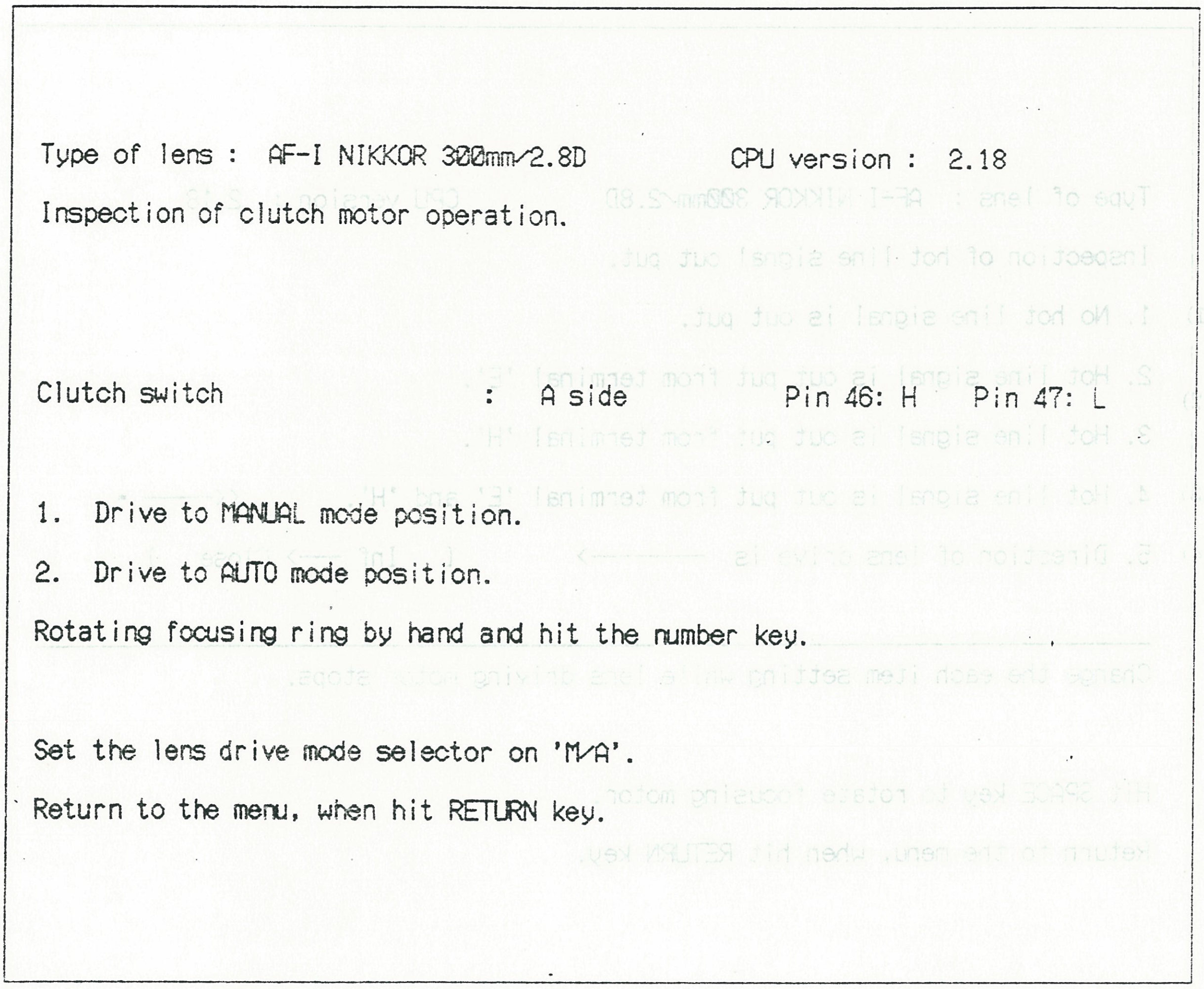
```
   Type of lens :  AF-I NIKKOR 300mm/2.8D          CPU version :  2.18

   Inspection of hot line signal out put.

1) 1. No hot line signal is out put.

   2. Hot line signal is out put from terminal 'E'.
2)
   3. Hot line signal is out put from terminal 'H'.

3) 4. Hot line signal is out put from terminal 'E' and 'H'.      <<---- *

4) 5. Direction of lens drive is  -------->         [   Inf ---> Close   ]
  ____________________________________________________________________________
   Change the each item setting while lens driving motor stops.


   Hit SPACE key to rotate focusing motor.

   Return to the menu, when hit RETURN key.
```

In this inspection system, we designate two rectangular wave forms converted from four sinusoidal wave forms output from glass encoder as a hotline signal. We will output two wave forms (phase A and B as they are) or exclusive OR signal from the E and H terminals of the AF-I lens communication box through built-in circuitry. You can check the state of lens operation and hotline output by monitoring the wave forms using an oscilloscope.

1) No hotline signal is output from the lens contacts (E and H) when entering 1 from the keyboard.
2) Exclusive OR (phase A and B) signal is output from the terminal E or H when entering 2 or 3 from the keyboard.
3) Signal is output from the lens contact E (phase B) and terminal H (phase A) when entering 4 from the keyboard.
4) Lens driving direction can be selected when entering 5 from the keyboard.

計画課
M

## (8) Inspection of clutch motor operation



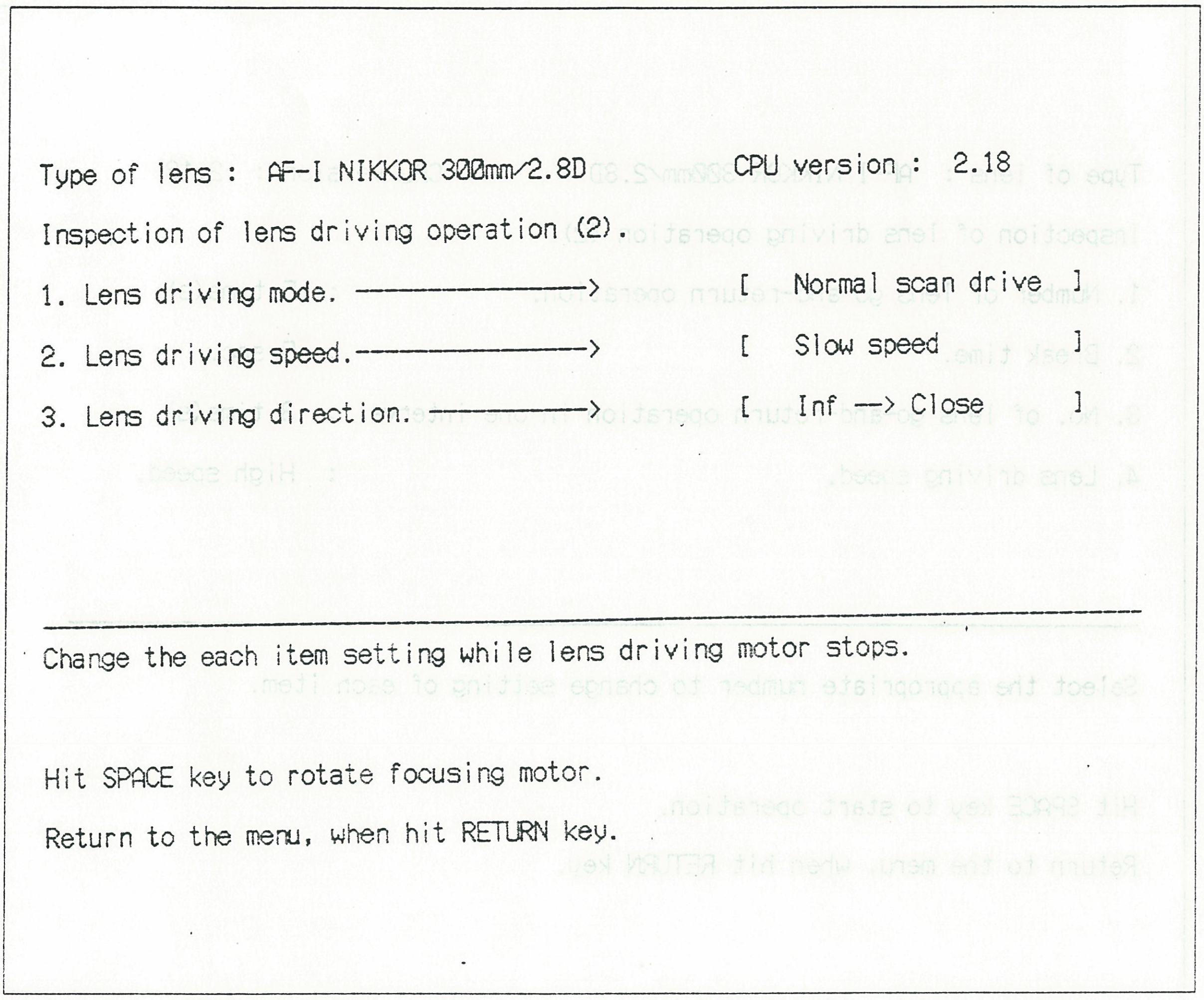
```
Type of lens :  AF-I NIKKOR 300mm/2.8D          CPU version :  2.18

Inspection of clutch motor operation.


Clutch switch                          :   A side        Pin 46: H    Pin 47: L


1.  Drive to MANUAL mode position.

2.  Drive to AUTO mode position.

Rotating focusing ring by hand and hit the number key.


Set the lens drive mode selector on 'M/A'.

Return to the menu, when hit RETURN key.
```

**Outline**

Press the numeric key (1.2.) on the PC keyboard while turning the focus ring manually and check clutch motor operation and A-M mode switching operation of the clutch switch.

計画課
M

## (9) Inspection of lens driving operation (1)



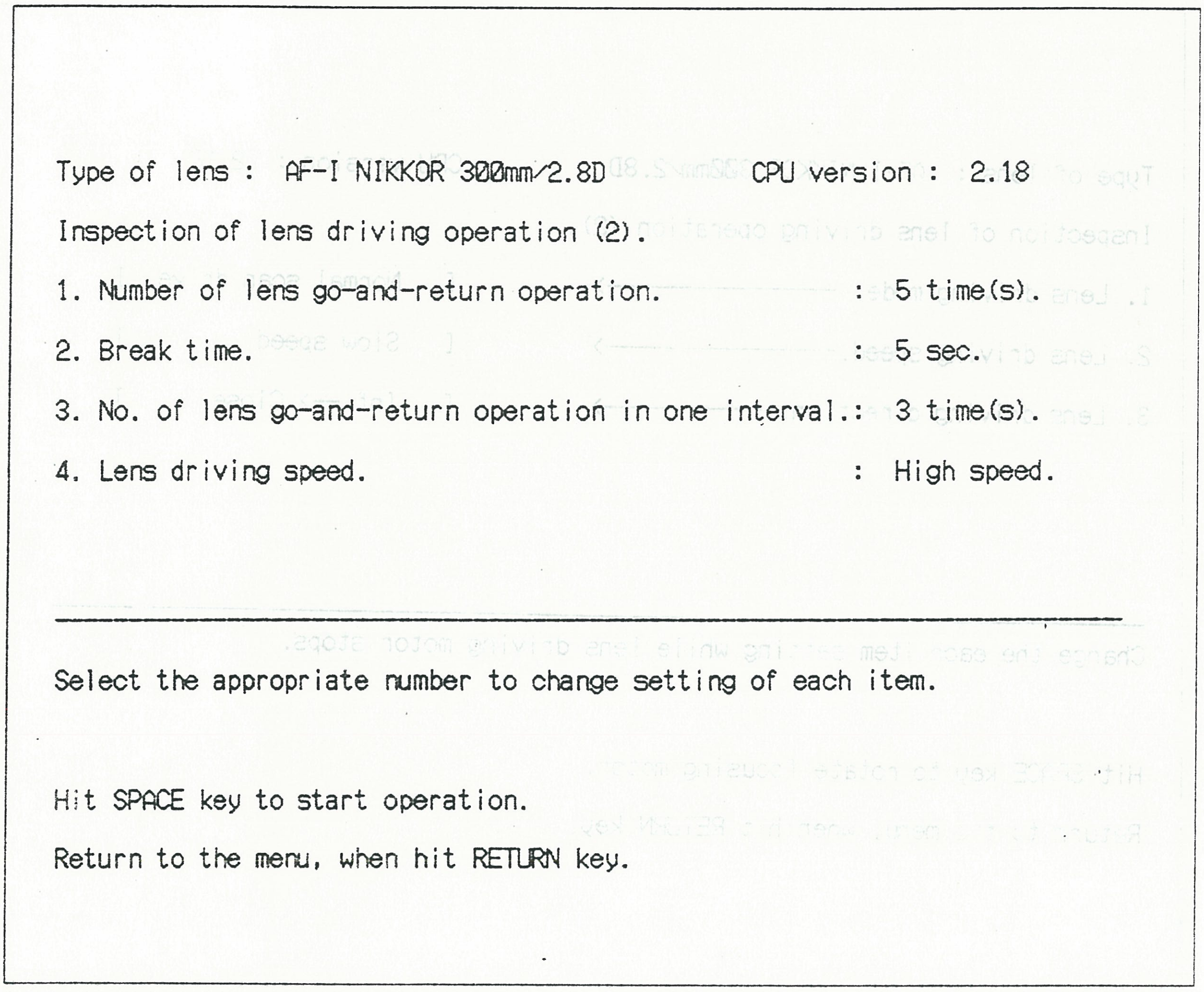
```
Type of lens :  AF-I NIKKOR 300mm/2.8D           CPU version :  2.18

Inspection of lens driving operation (2).

1. Lens driving mode. ------------------->        [  Normal scan drive  ]

2. Lens driving speed.------------------->        [  Slow speed         ]

3. Lens driving direction.--------------->        [  Inf --> Close      ]

-----------------------------------------------------------------------------
Change the each item setting while lens driving motor stops.


Hit SPACE key to rotate focusing motor.

Return to the menu, when hit RETURN key.
```

**Outline**
Checking lens operation is possible by normal scan drive operation. Lens driving speed can be selected from slow, medium and high speed options.

*In the normal drive operation, speed is controlled by pulses output from the glass encoder. (Drive mode in actual use)

計画課
M

### (10) Inspection of lens driving operation (2)



```
Type of lens :  AF-I NIKKOR 300mm/2.8D          CPU version :  2.18

Inspection of lens driving operation (2).

1. Number of lens go-and-return operation.                :  5 time(s).

2. Break time.                                            :  5 sec.

3. No. of lens go-and-return operation in one interval.:  3 time(s).

4. Lens driving speed.                                    :  High speed.


Select the appropriate number to change setting of each item.


Hit SPACE key to start operation.

Return to the menu, when hit RETURN key.
```

**Outline**
Set the lens driving and driving speed arbitrary to check the lens operation with interval driving.

計画課
M

INC

JAA32651-R.3311.A

# AF-I Nikkor ED 300mm f/2.8 D IF

## DISASSEMBLING / ASSEMBLING / ADJUSTMENT

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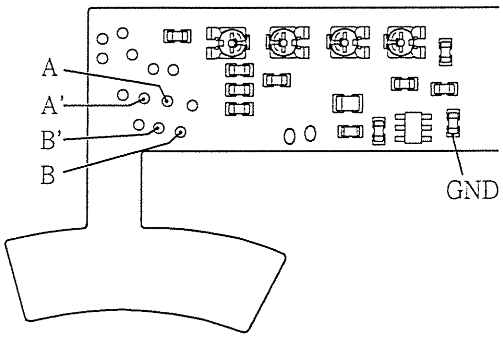
Tokyo, Japan

# Corrections
# AF-I Nikkor ED 300mm f／2.8 D

## Mistake

- A12 -



- A12 -

○ Setting oscilloscope (reference values)

| | |
|---|---|
| VOLTS／DIV | 200mV |
| TIME／DIV | 0.5mS |

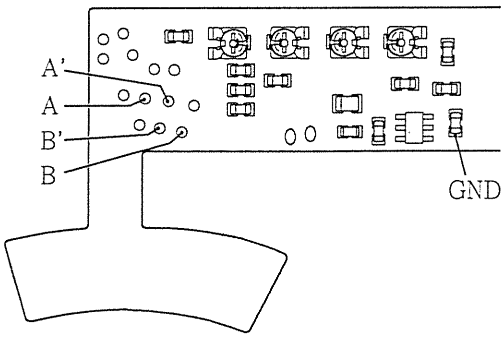
- A15 -

○ Setting oscilloscope (reference values)

| | |
|---|---|
| VOLTS／DIV | 0.5V |
| TIME／DIV | 200mS |

## Correct

- A12 -



- A12 -

○ Setting oscilloscope (reference values)

| | |
|---|---|
| VOLTS／DIV | 200mV |
| TIME／DIV | 1mS |

- A15 -

○ Setting oscilloscope (reference values)

| | |
|---|---|
| VOLTS／DIV | 2 V |
| TIME／DIV | 1mS |

# Supplement

## ◎ How to check F4 camera with AF-I lens

**Note:** This checking procedure is only for confirming if each of the following functions works properly. And for checking accuracy, please use the communication tool.

1. Autofocus operation

After subject was in focus, confirm the focus in the viewfinder.
It is normal that the lens stops one or two times until subject is correctly focused.
According to the conditions, there are occasions when lens scans subject. However, unless it focuses correctly, it is bad.
(Glass encoder or the contact of electrical circuit is bad.)

2. Range limiter (scan range is reference value)

| Model | Full range | ∞ ~ middle | Middle ~ close |
|---|---|---|---|
| 300/2.8 | ∞ ~ 2.5m | ∞ ~ 5.7m | 7.1m ~ 2.5m |
| 600/4 | ∞ ~ 6.0m | ∞ ~ 11.3m | 14.3m ~ 6.0m |

3. Focus lock switch

AF drive must be locked at all four spots and stop without fail even while it is scanning.

4. Mode select switch

① A mode

Even if you rotate the focus ring, you are ignored. At this time the focus ring can be rotated freely 360° .

② M/A mode

When you keep the shutter release button lightly pressed and rotate focus ring, the camera must be changed to M mode. At this time the focus ring rotates simultaneously with the distance scale. (In the case where they slips, the gearing of the clutch is bad.)

③ M mode

AF motor and clutch does not move. You can focus subject manually without fail.

5. ① In the situation where the whole lens is covered and ray is entered conversely only through the viewfinder, drive the AF lens. At this time it moves at a low and even speed.

② Attaching SB-24 or MF-23 with it, confirm that the indicator of the maximum aperture on lens is F4 or F2.8. And P and S mode on F4 body must operate normally. (Unless they operate, the point of contact in camera or lens is bad, or electrical system in lens is bad.)

# 〔2〕 DISASSEMBLING

**Note:** ① The tone of pictures may be different from actual one. Make sure of the shape of parts when disassembling and assembling.

② The mark ▽ shows the position of index.

③ ☐ : Disassembling／assembling

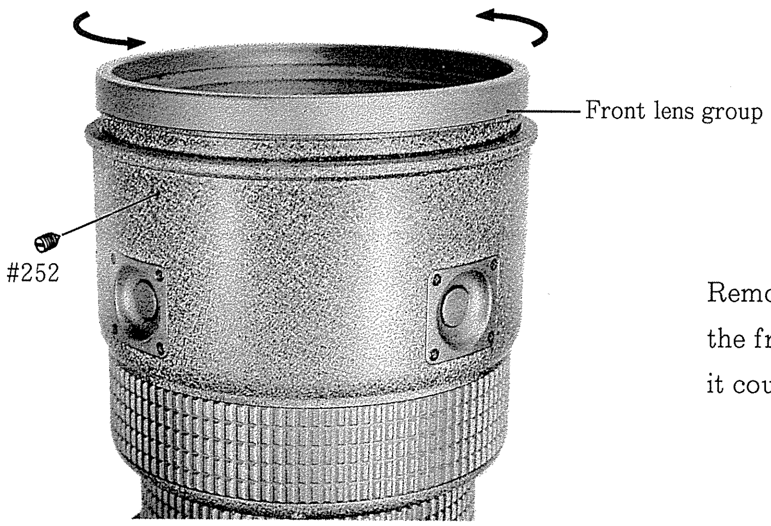
☐ : Adjustment

☐ : Additional work

④ All screws mentioned in this publication are right-handed screws unless otherwise mentioned. Rotate screws counter-clockwise to unfasten, and clockwise to fasten.

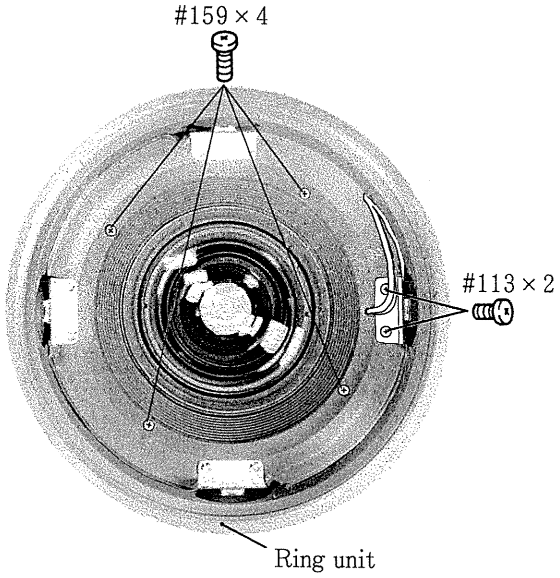
⑤ Send the lens back to Nikon if the front lens group (ED glass) is damaged.

## FRONT LENS GROUP

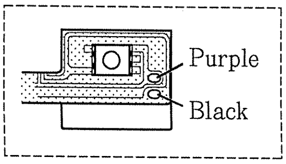


Remove screw #252 and remove the front lens group by rotating it counter-clockwise.

## RING UNIT, FOCUS LOCK FPC UNIT

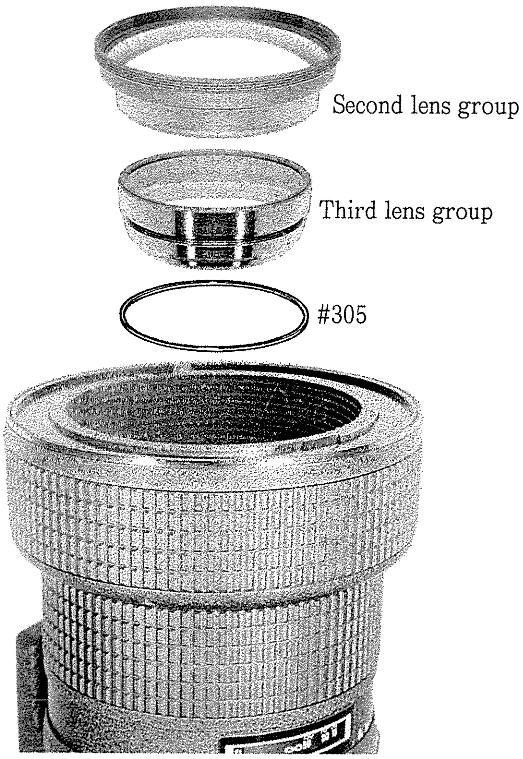


① Remove screws #113 × 2 on the switch unit with wires attached and remove soldering on the wires. (Refer to the figure below)

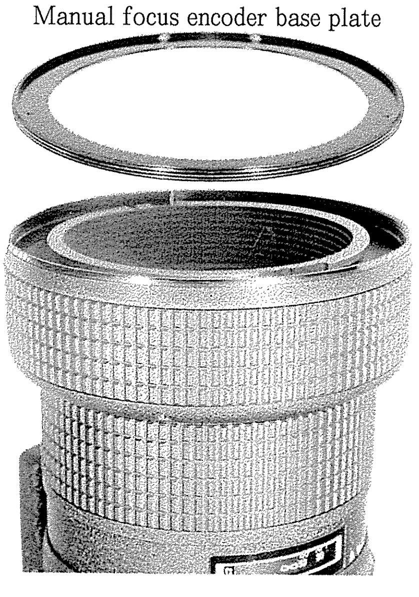


② Remove screws #159 × 4 to remove driving ring unit.

## SECOND LENS GROUP, THIRD LENS GROUP

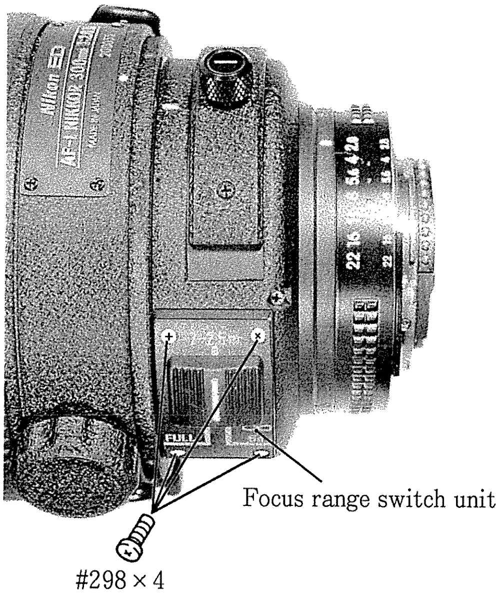

Second lens group
Third lens group
#305

## MANUAL FOCUS ENCODER BASE PLATE

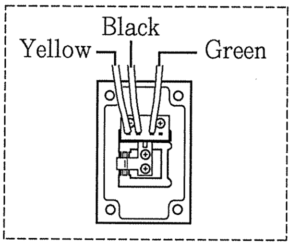

Manual focus encoder base plate

- Since the manual focus encoder base plate is secured by screw lock, use alcohol to dissolve screw lock and remove the base plate.

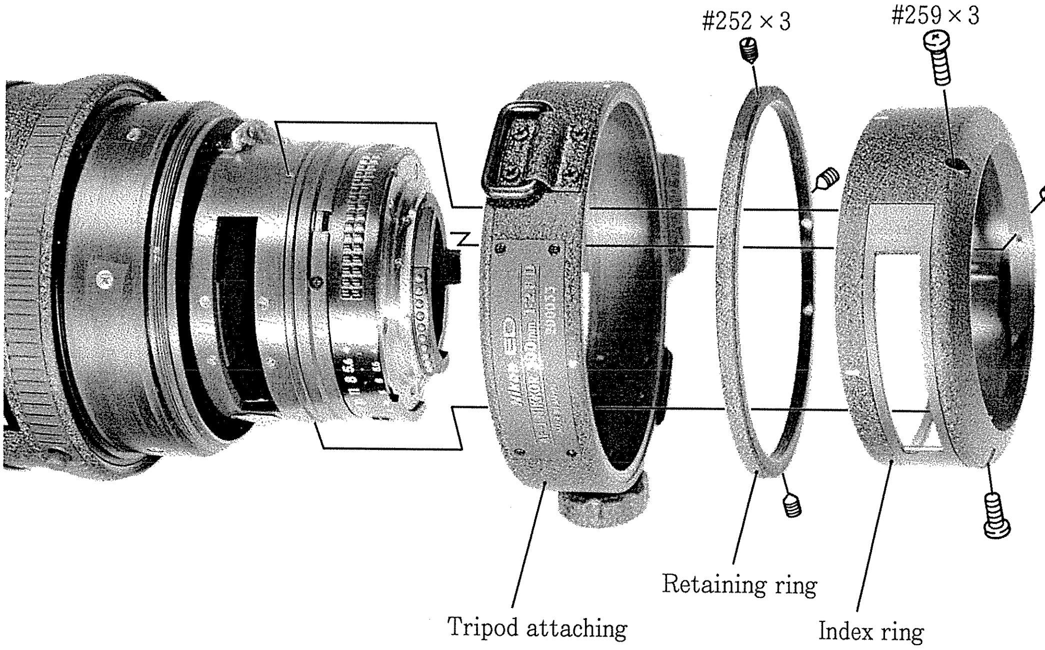
## FOCUS RANGE SWITCH UNIT


Focus range switch unit
#298 × 4

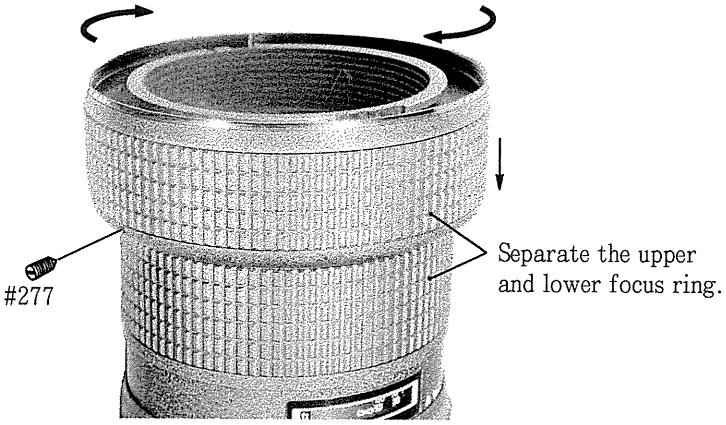
- Remove the screws #298 × 4.
- Remove the focus range switch unit and remove soldering of wires. (Refer to the figure below)


Black
Yellow
Green

## INDEX RING, TRIPOD ATTACHING, RETAINING RING

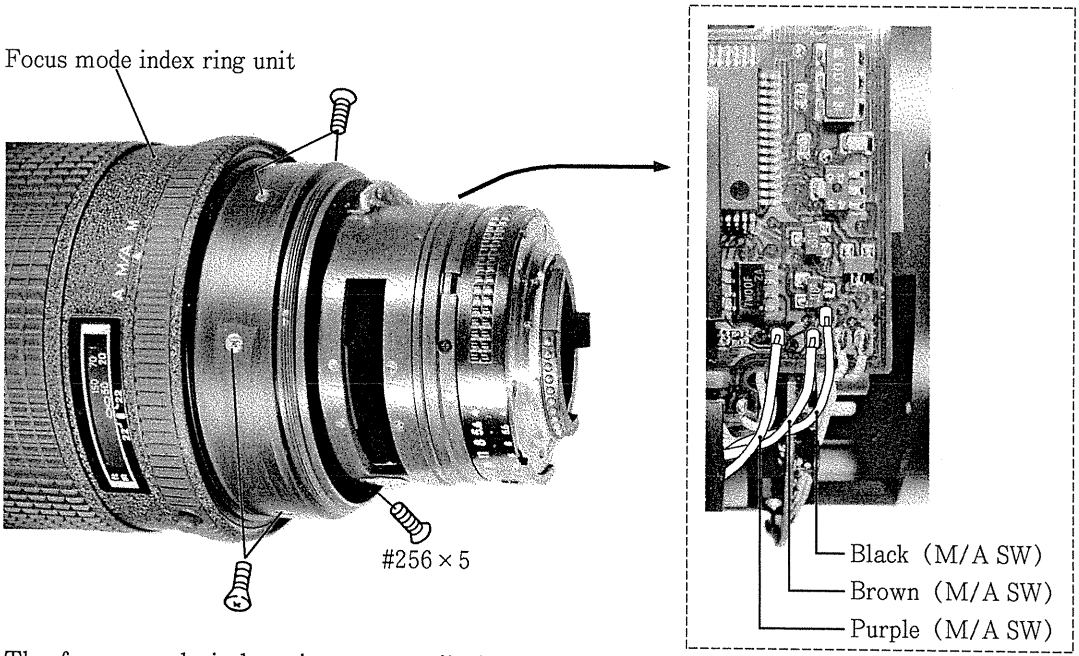

#252 × 3
#259 × 3
Retaining ring
Tripod attaching
Index ring

## FOCUS RING


#277
Separate the upper and lower focus ring.

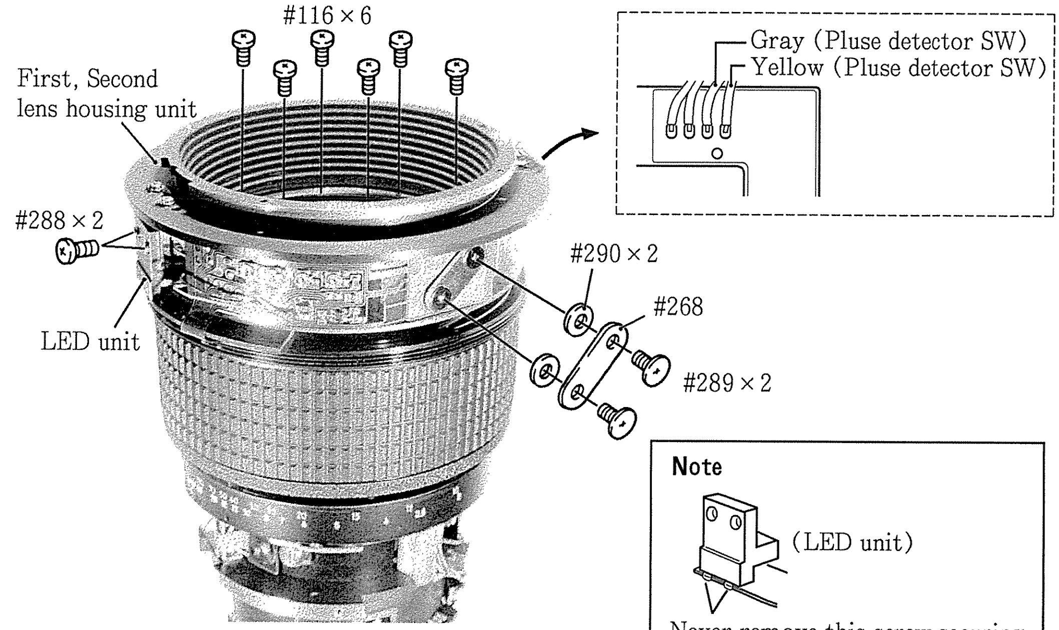
- Remove screw #277.
- Rotate the upper focus ring counter-clockwise to separate it from the lower it.
- Remove the upper focus ring toward the lower side (bayonet mount side)

## FOCUS MODE INDEX RING UNIT


Focus mode index ring unit
#256 × 5
Black (M/A SW)
Brown (M/A SW)
Purple (M/A SW)

- The focus mode index ring can easily be removed at the position where the focus mode switch is adjusted to "M/A".

## FIRST, SECOND LENS HOUSING UNIT, LED UNIT

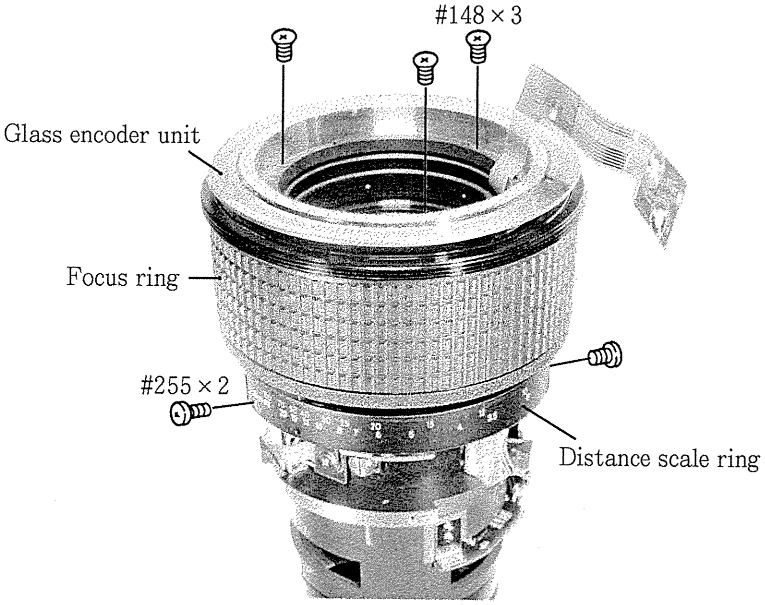

#116 × 6
First, Second
lens housing unit
#288 × 2
LED unit
Gray (Pluse detector SW)
Yellow (Pluse detector SW)
#290 × 2
#268
#289 × 2

**Note**

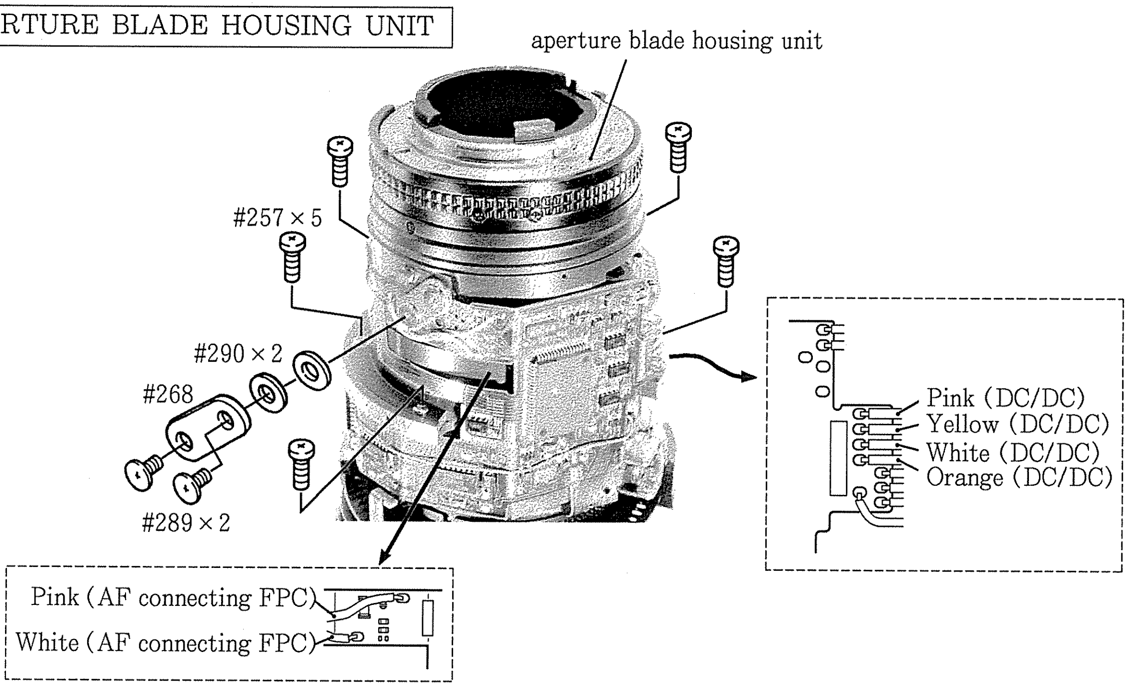
(LED unit)

Never remove this screw securing the LED unit.

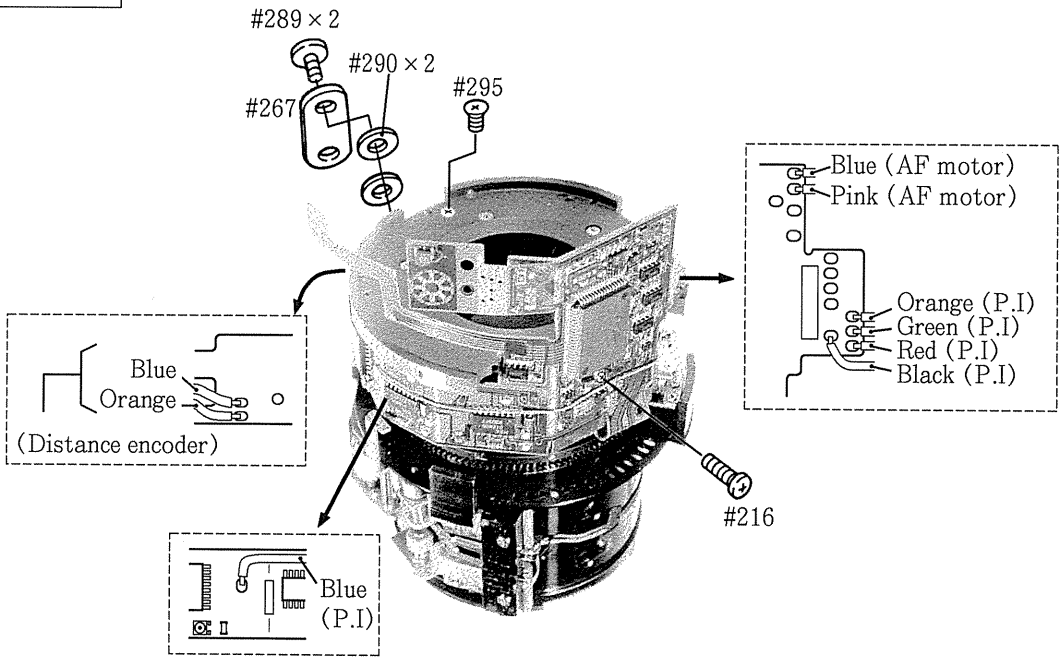
## GLASS ENCODER UNIT, DISTANCE SCALE RING

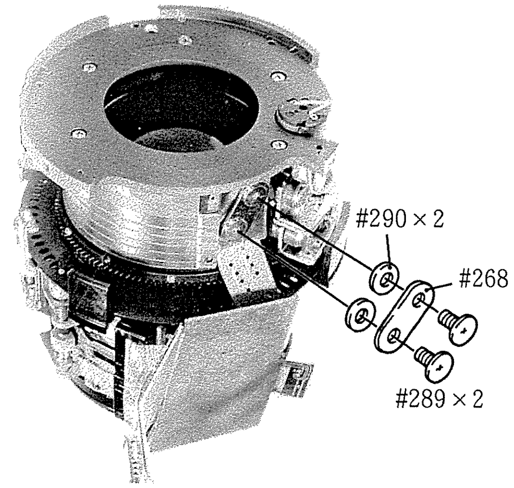

#148 × 3
Glass encoder unit
Focus ring
#255 × 2
Distance scale ring

## APERTURE BLADE HOUSING UNIT

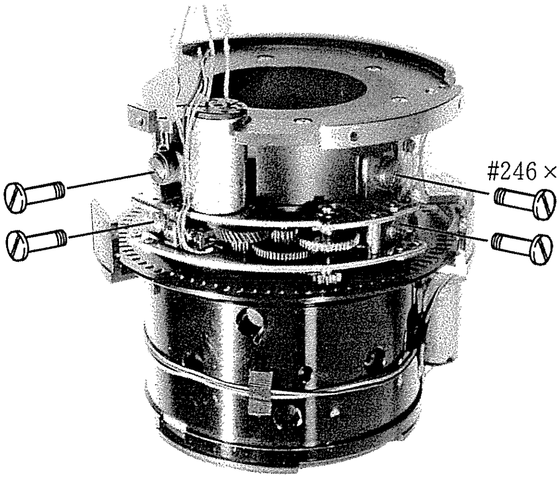

aperture blade housing unit
#257 × 5
#290 × 2
#268
#289 × 2
Pink (DC/DC)
Yellow (DC/DC)
White (DC/DC)
Orange (DC/DC)
Pink (AF connecting FPC)
White (AF connecting FPC)

## MAIN FPC

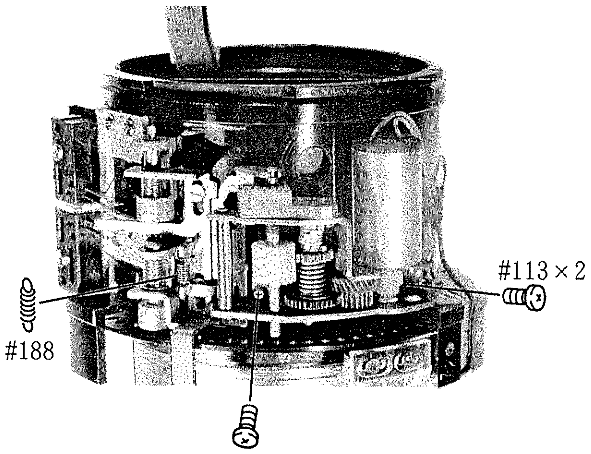

#289 × 2
#290 × 2
#295
#267
Blue (AF motor)
Pink (AF motor)
Orange (P.I)
Green (P.I)
Red (P.I)
Black (P.I)
Blue
Orange
(Distance encoder)
#216
Blue
(P.I)

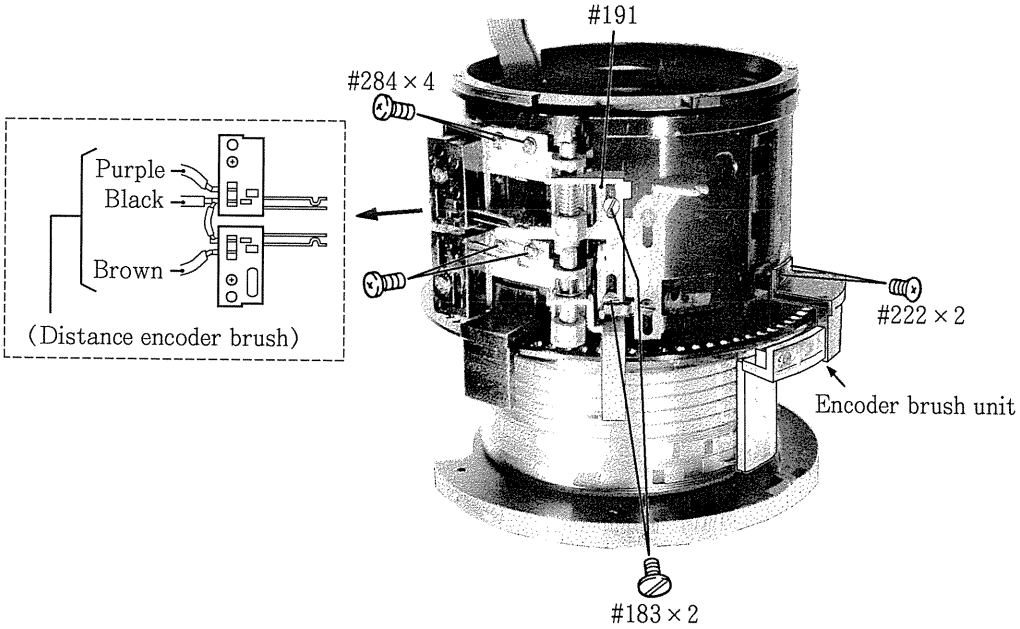

#290 × 2
#268
#289 × 2

## AF GEAR UNIT

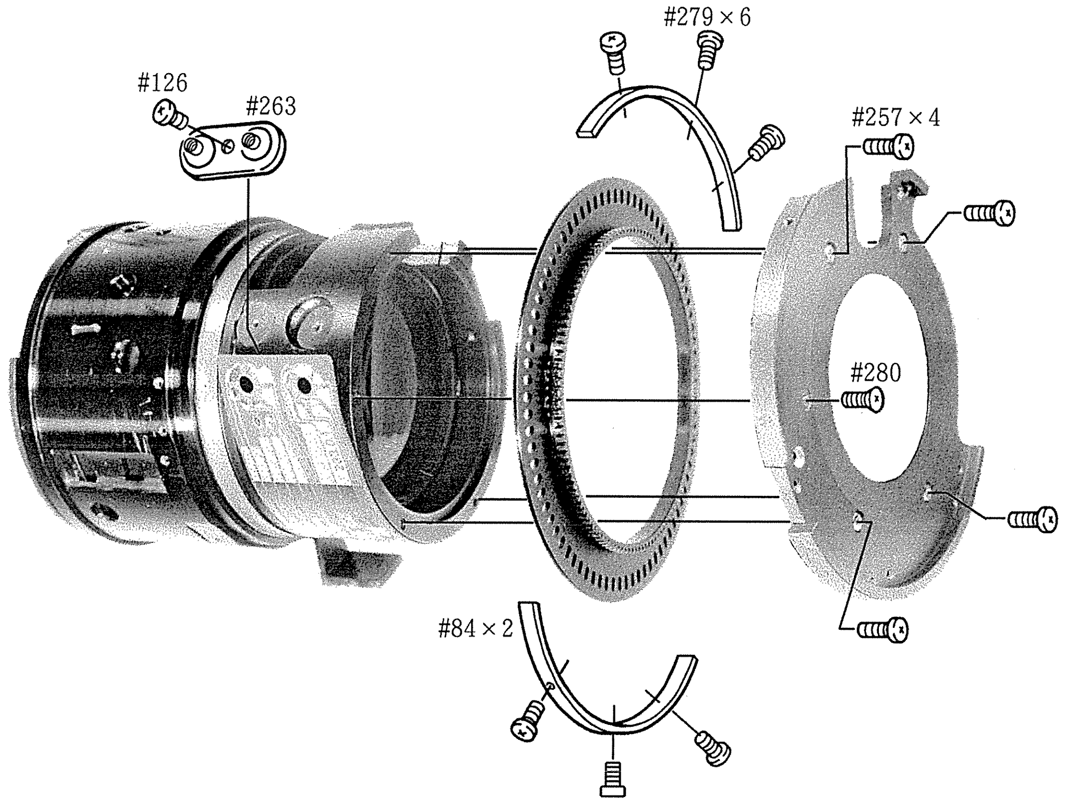


## A/M SWITCH, CLUTCH MOTOR UNIT, ENCODER BRUSH UNIT

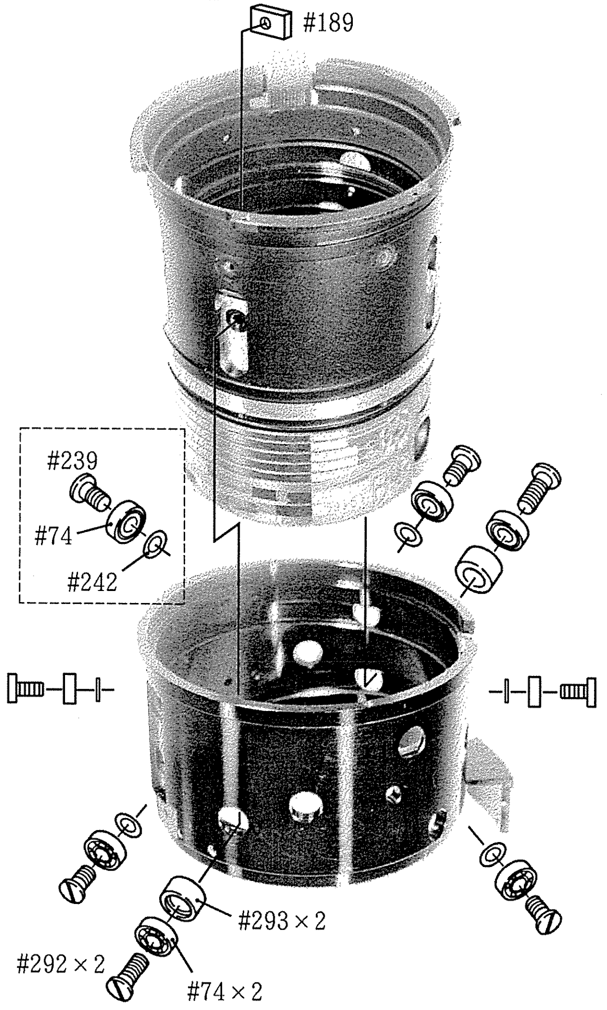



#191
#284 × 4
Purple
Black
Brown
(Distance encoder brush)
#222 × 2
Encoder brush unit
#183 × 2

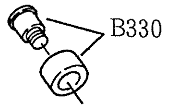
## MODE RING RETAINING RING, MULTI-HOLE RING


#279 × 6
#126
#263
#257 × 4
#280
#84 × 2

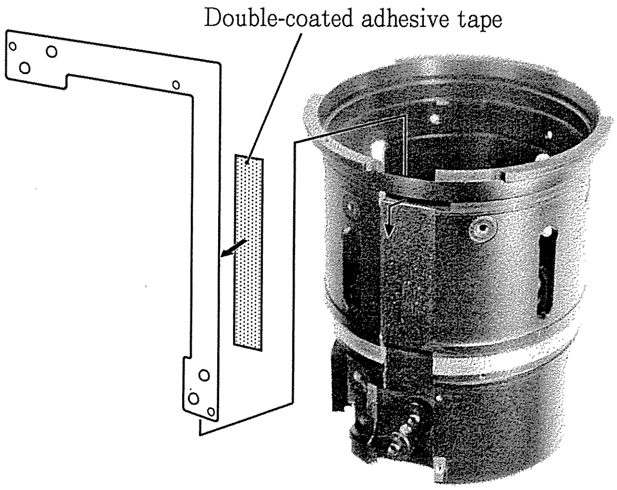
## THIRD DRIVING CAM GROUP


#189
#239
#74
#242
#293 × 2
#292 × 2
#74 × 2

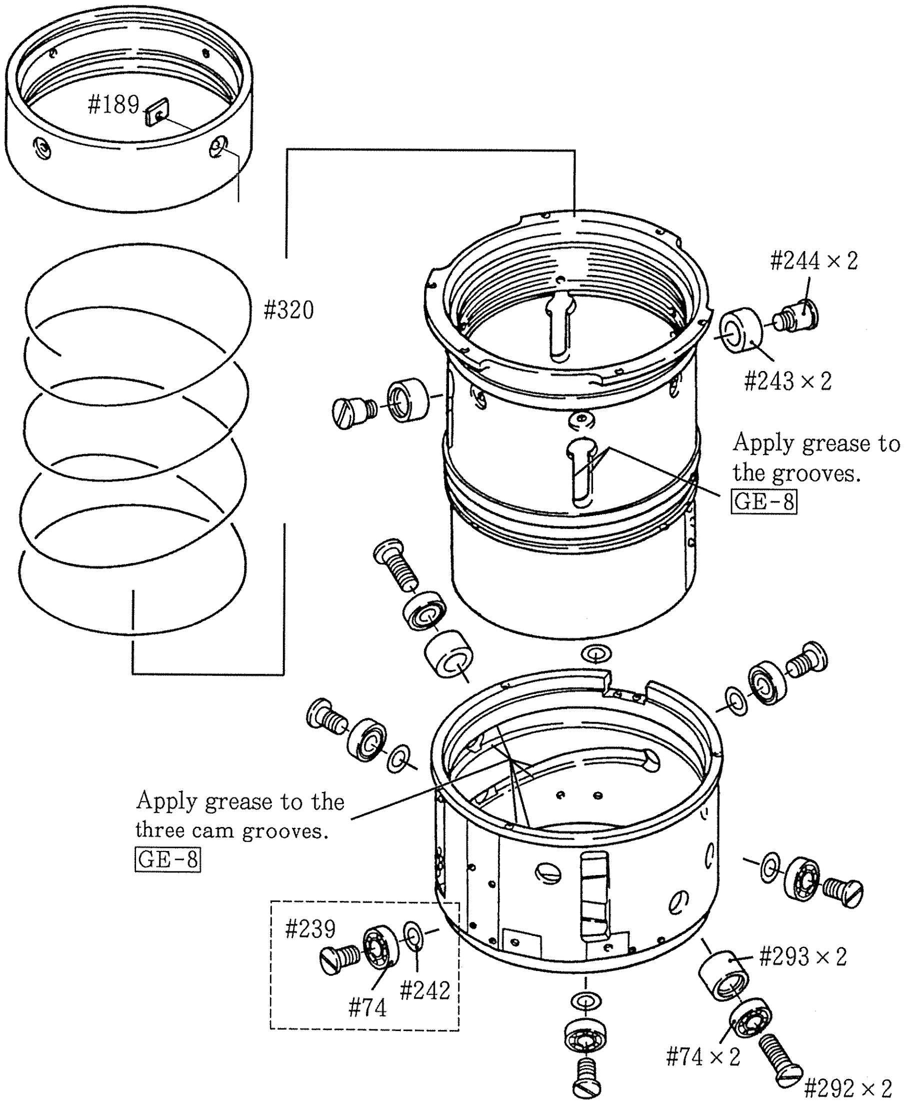
**Note:** Parts as shown in the picture by dotted lines are used in the lens units (produced during the initial period of volume production) at 6 portions. Later the part as shown by dotted lines are used at 3 portions and parts as shown below are used at the rest of portions.



## CONNECTING FPC


Double-coated adhesive tape

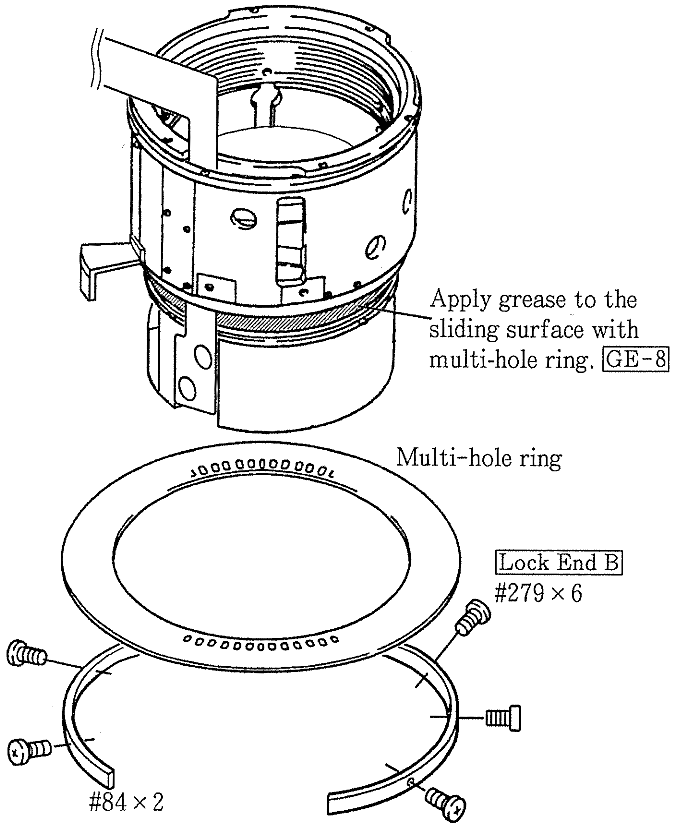
## CAM RING, THIRD LENS DRIVING RING


#189
#320
#244 × 2
#243 × 2
Apply grease to the grooves.
GE-8
Apply grease to the three cam grooves.
GE-8
#239
#74
#242
#293 × 2
#74 × 2
#292 × 2

**Note:** Be sure to choose one of the following combinations by checking individual accuracy of overrun and servo stop operations for the parts encircled by dotted lines.

- Parts encircled by dotted lines × 6 positions.
- Parts encircled by dotted lines × 3 positions and B330 (refer to D8) ×3 positions.

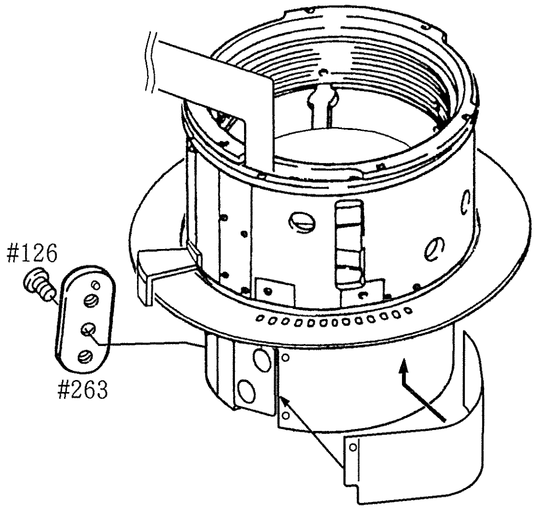
## MULTI-HOLE RING


Apply grease to the sliding surface with multi-hole ring. GE-8
Multi-hole ring
Lock End B
#279 × 6
#84 × 2

- Do not overfasten screws #279 × 6 when mounting #84 × 2 since these parts are easily deformed.

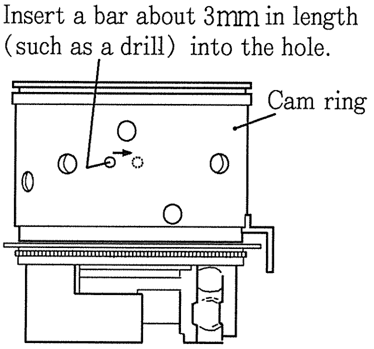
**Inspection**: Check that there is no mounting backlash in the porous ring.

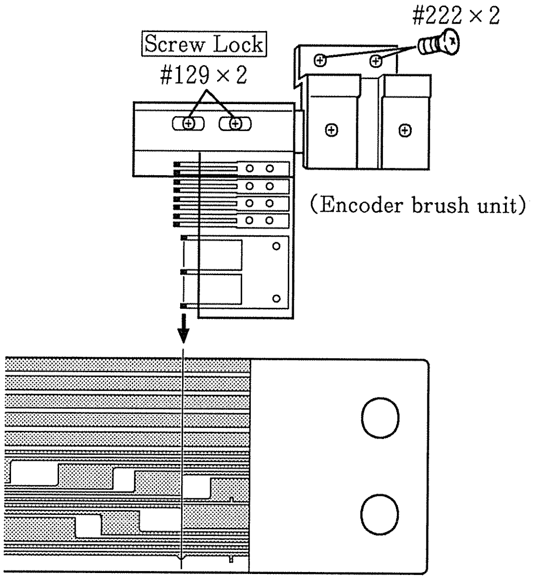
## ENCODER FPC


#126
#263
Encoder FPC

- As shown in the figure, attach the encoder FPC to the lens body while aligning both ends and moving it aside in the direction of the arrow.

## ADJUSTMENT OF ENCODER BRUSH POSITION


Insert a bar about 3mm in length (such as a drill) into the hole.
Cam ring


#222 × 2
Screw Lock
#129 × 2
(Encoder brush unit)

① Turn the cam ring to align the position of the hole.

② Insert a bar about 3mm in length (such as a drill) into the hole and secure the cam ring.

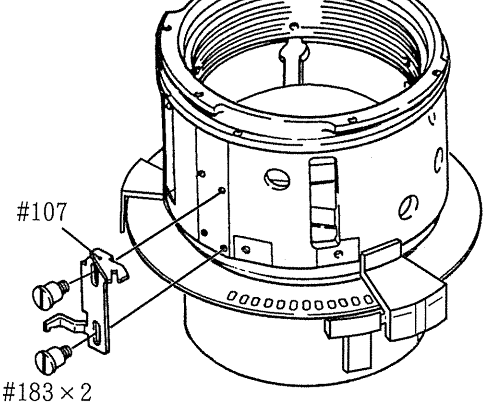
③ Attach the encoder brush unit to the cam ring.

④ Unfasten screws #129 × 2 and let the brush tip come into contact with the line as shown in the figure.

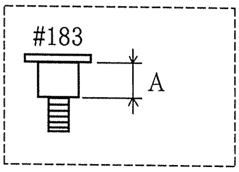
⑤ Fasten screws #129 × 2 and turn the cam ring several times to check the location of the brush.

⑥ Secure screws #129 × 2 using Screw Lock.

## CLUTCH LATCH LEVER #107

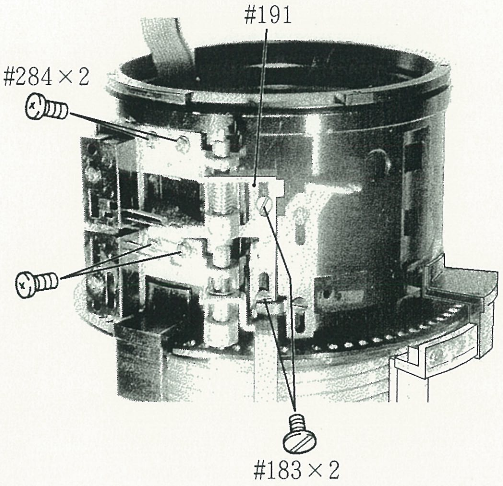


**Note:** Choose screws #183 × 2 from the table below while checking operation of clutch latch lever #107.

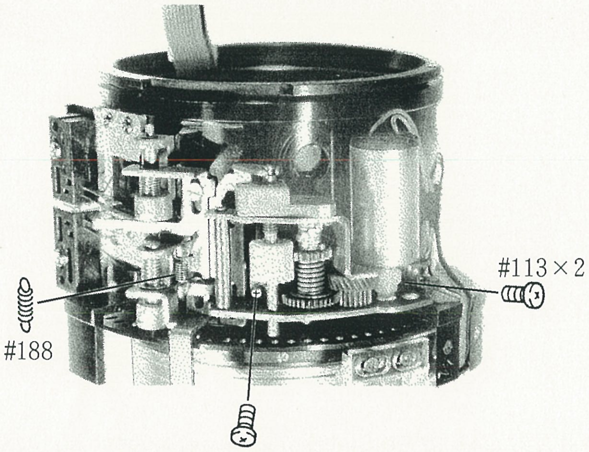


| A | Parts No. | Toleance |
|---|---|---|
| ① | 1K130−496 | +0.04<br>−0.07 |
| ② | 1K130−504 | +0.07<br>−0.1 |

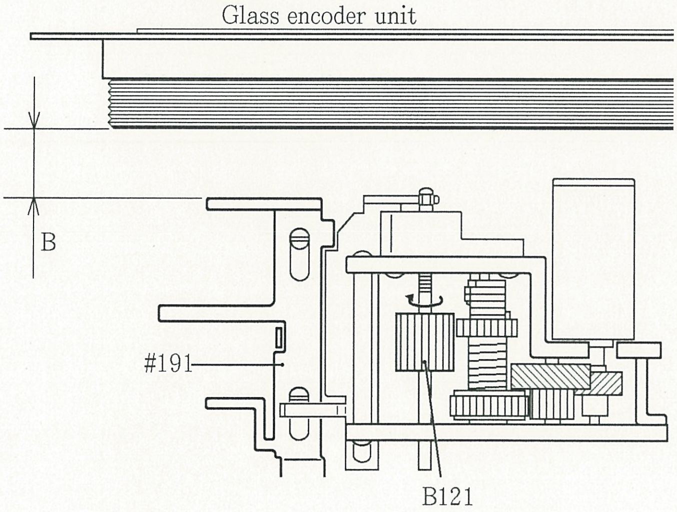
## A/M SWITCH



## CLUTCH MOTER UNIT



## ADJUSTMENT OF CLUTCH MOTOR UNIT POSITION



① Temporarily attach the glass encoder unit.

② Rotate gear B121 in the direction of the arrow until it comes to a stop at the stopper.

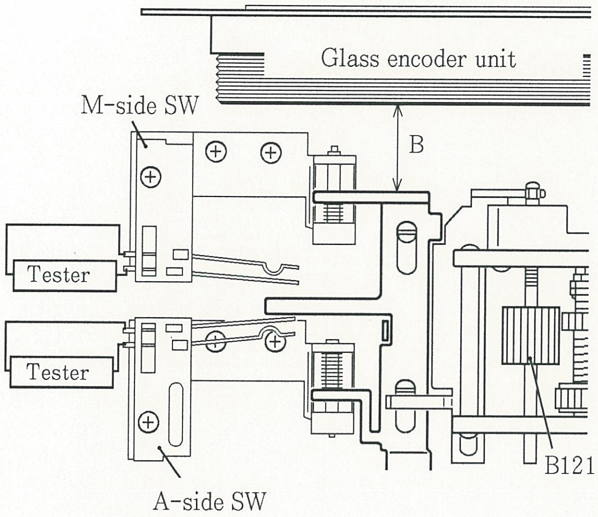
③ Measure the distance "B" between the end of glass encoder unit and the bar #191.

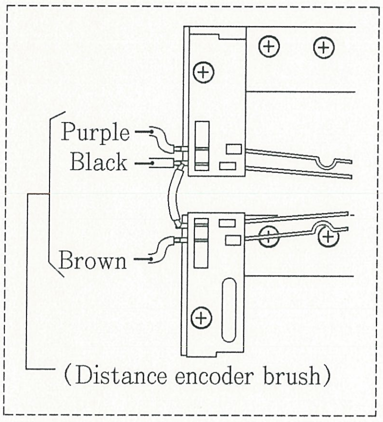
④ If the difference is out of the standard value, move the attachment position of the clutch motor unit to adjust the distance "B".

△1 **Standard value : 12.6 ± 0.03**

計画課 M

## ADJUSTMENT OF A／M SWITCH POSITION


Glass encoder unit
M-side SW
B
Tester
Tester
B121
A-side SW


Purple
Black
Brown
(Distance encoder brush)

① Connect the contact of the M-side switch to the tester.

② Rotate gear B121 and measure the distance "B" where the switch turns ON and OFF.

③ If the distance "B" is out of the standard value, move the attachment position of the switch or adjust the distance by bending the contact.

④ Perform the same procedures ①～③ for A-side switch.

**Standard value**

△1

| A－side switch | | M－side switch | |
|---|---|---|---|
| ON | OFF | ON | OFF |
| 11.85～12.25 | 11.85 Less | 8.85～9.25 | 9.25 Over |

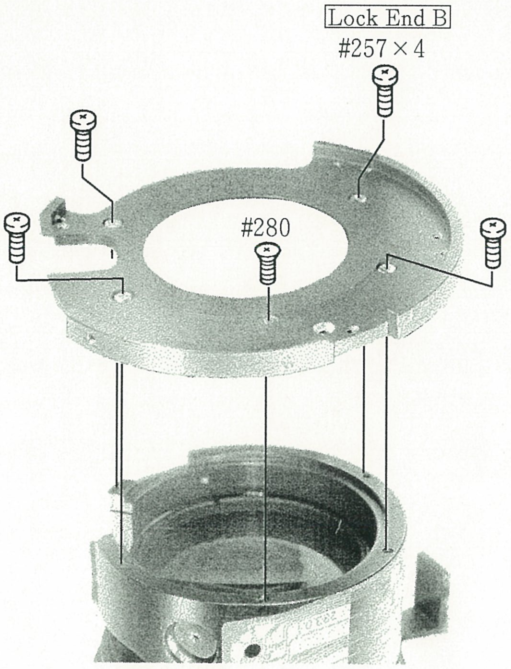
⑤ After adjustment, solder the wire and the A／M switch.

△1 Refer to the Technical Information bulletin which follows since repair procedures have been modified.

① L(AF) - 930094

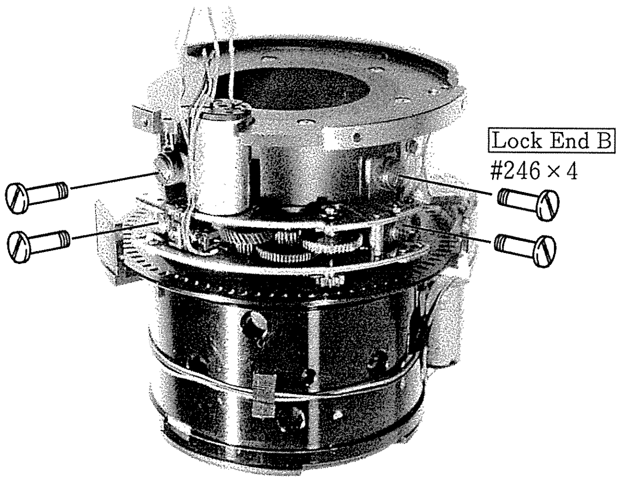
② L(AF) - 930102

## MODE RING RETAINING RING


Lock End B
#257×4
#280

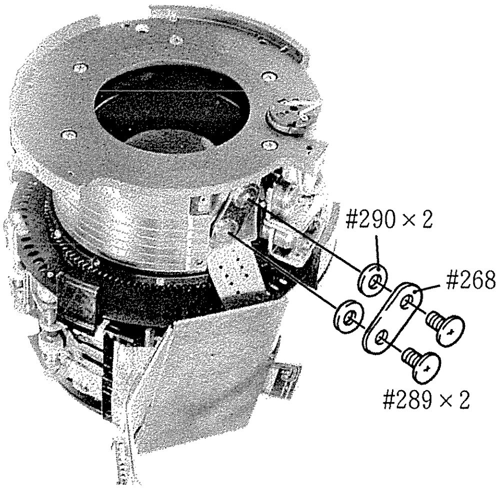
計画課
M

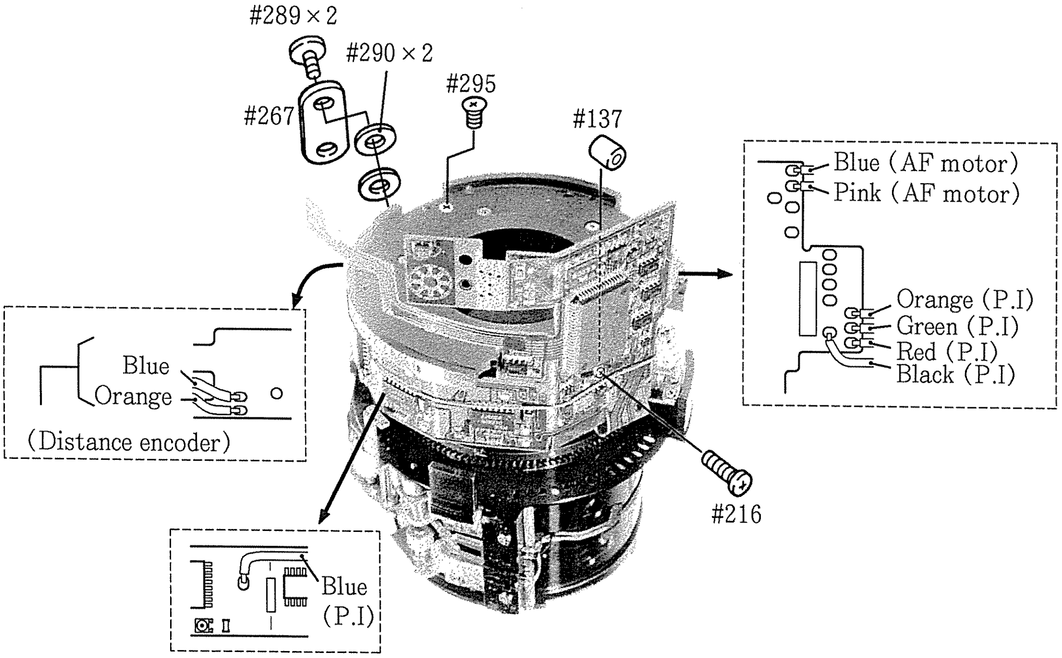
## AF GEAR UNIT


Lock End B
#246 × 4

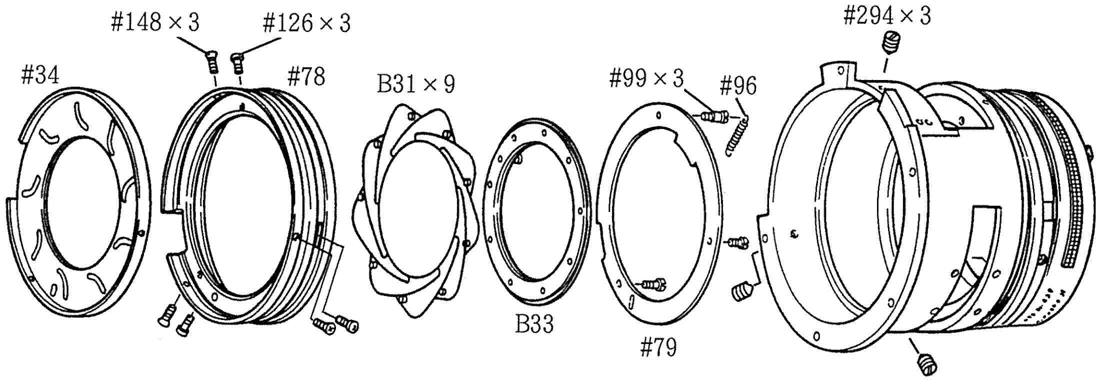
**Inspection:**
After attaching the AF gear unit, check rotation operation.

## MAIN FPC


#290 × 2
#268
#289 × 2


#289 × 2
#290 × 2
#267
#295
#137
Blue
Orange
(Distance encoder)
Blue (AF motor)
Pink (AF motor)
Orange (P.I)
Green (P.I)
Red (P.I)
Black (P.I)
#216
Blue
(P.I)

## APERTURE BLADE GROUP



## ADJUSTMENT OF APERTURE OPENING

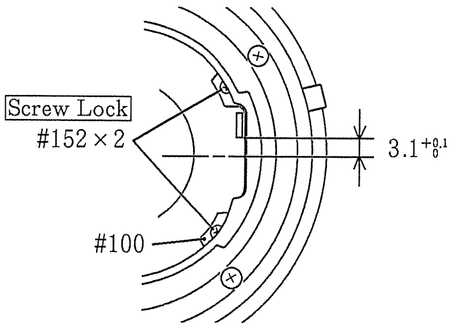
① Unfasten screws #294 × 3 and move part #34 to adjust the aperture diameter. As a guide to adjustment, the full aperture (f/2.8) should be the same size as the inside diameter of part #34. (The inside diameter of part #34 is 35.92mm, the same as that of inscribed circle diameter.)

- Aperture diameter should be within the allowable range when the aperture ring is rotated forward and backward.
- Aperture lever should be within the allowable range when the aperture lever is snapped by your finger.

② After adjustment, secure screws #294 × 3 using Screw Lock.

| Aperture setting | Inscribed circle diameter (mm) | Toleance (mm) |
|---|---|---|
| 2.8 | 35.92 | 37.16 ~ 34.76 |
| 4 | 24.68 | 26.66 ~ 22.85 |
| 5.6 | 17.42 | 19.55 ~ 15.52 |
| 8 | 12.31 | 13.82 ~ 10.97 |
| 11 | 8.71 | 10.15 ~ 7.46 |
| 16 | 6.16 | 7.18 ~ 5.28 |
| 22 | 4.35 | 5.08 ~ 3.73 |

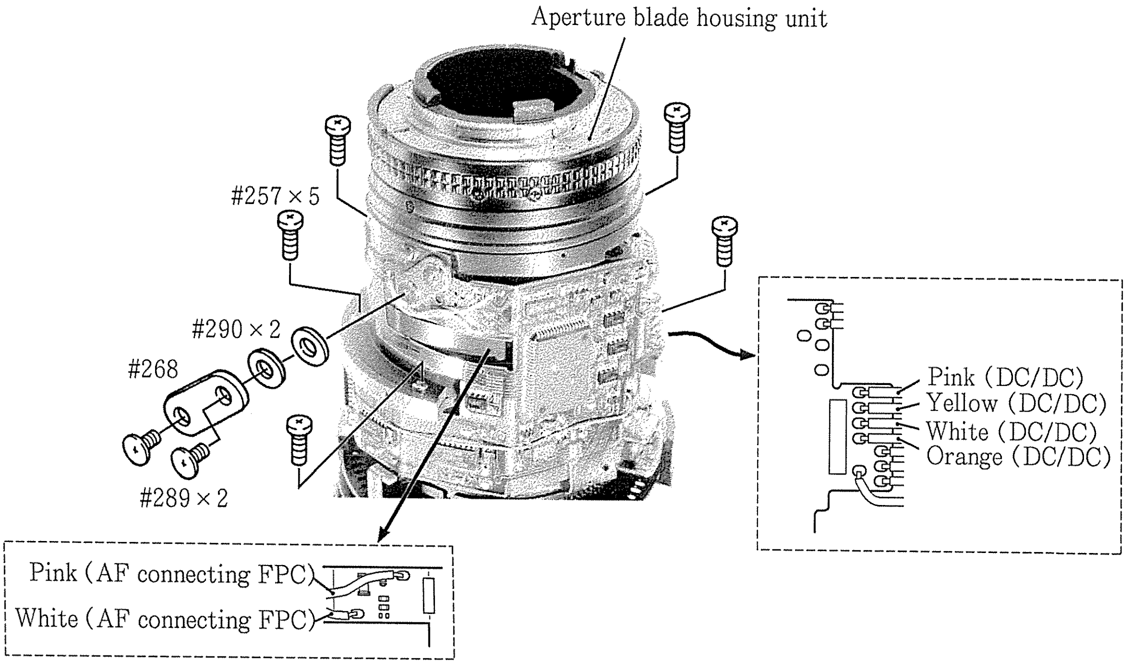
## ADJUSTMENT OF APERTURE LEVER POSITION


Screw Lock
#152 × 2
#100
$3.1^{+0.1}_{0}$

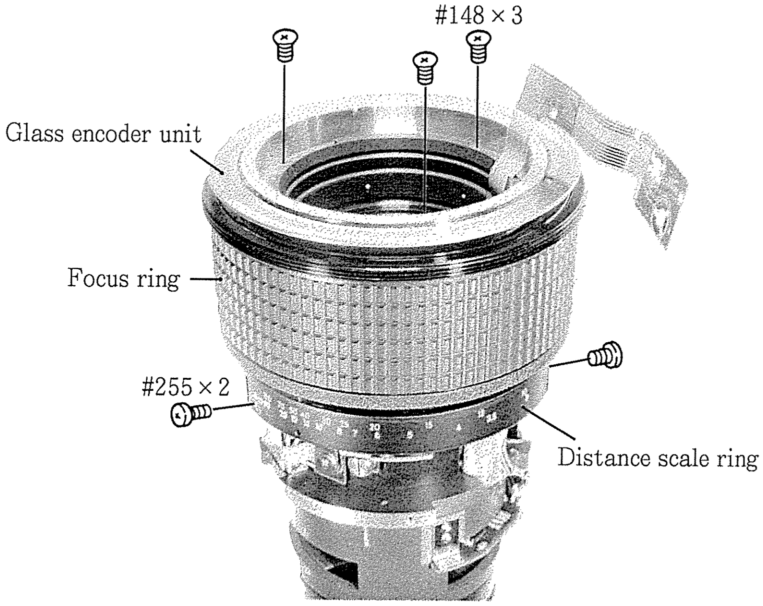
Unfasten screws #152 ×2 to adjust the position of the aperture lever #100 so that it comes into the rated value of $3.1^{+0.1}_{0}$ to bring the aperture diameter whitin rated value at full aperture. Together with this, adjust the horizontal position so that it does not come in contact with the bayonet mount and rear cover ring. After adjustment, fix screws #152 ×2 using Screw Lock.

***Reference:*** When adjusting the rated value of $3.1^{+0.1}_{0}$, set the aperture ring to f/2.8 and mount the tool J18004-1 on the bayonet mount.
It becomes much easier to adjust if you mount the aperture lever based on the groove of the tool as a reference.

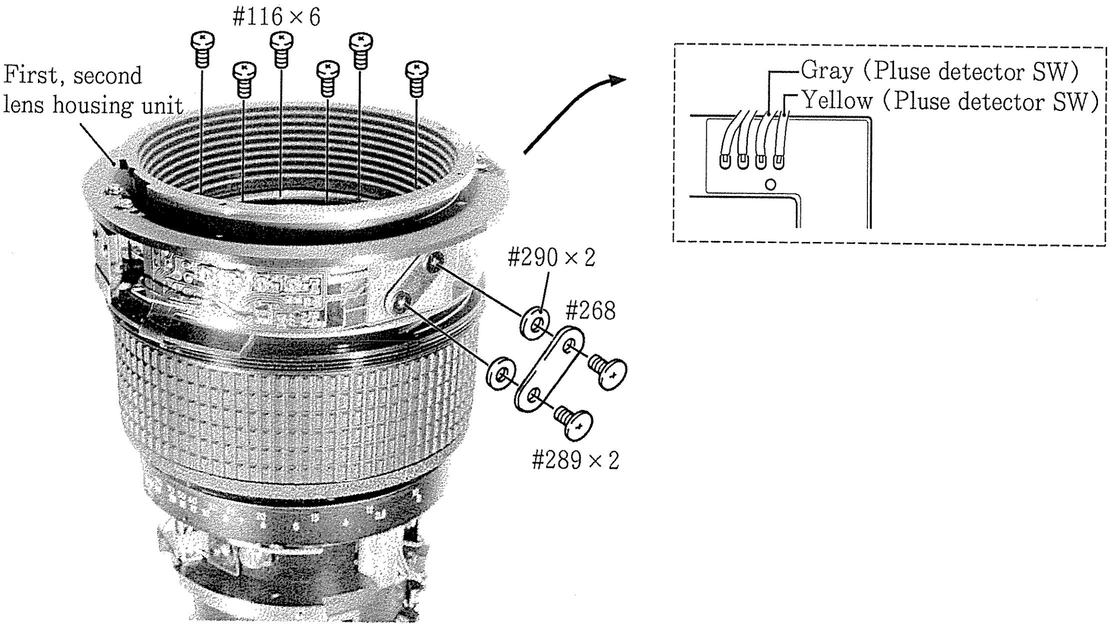
## APERTURE BLADE HOUSING UNIT


Aperture blade housing unit
#257 × 5
#290 × 2
#268
#289 × 2
Pink (AF connecting FPC)
White (AF connecting FPC)
Pink (DC/DC)
Yellow (DC/DC)
White (DC/DC)
Orange (DC/DC)

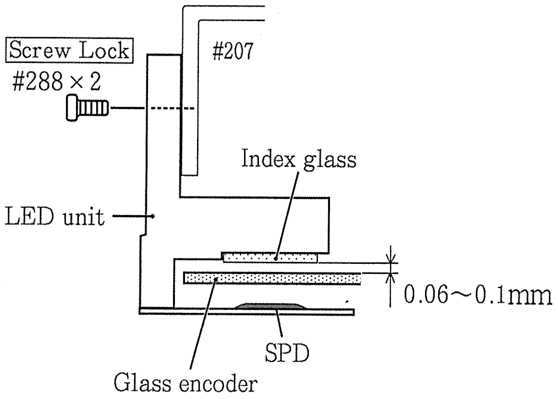
## GLASS ENCODER UNIT, DISTANCE SCALE RING


#148 × 3
Glass encoder unit
Focus ring
#255 × 2
Distance scale ring

## FIRST, SECOND LENS HOUSING UNIT


#116 × 6
First, second
lens housing unit
Gray (Pluse detector SW)
Yellow (Pluse detector SW)
#290 × 2
#268
#289 × 2

## ADJUSTMENT OF GAP BETWEEN THE LED AND THE GLASS ENCODER



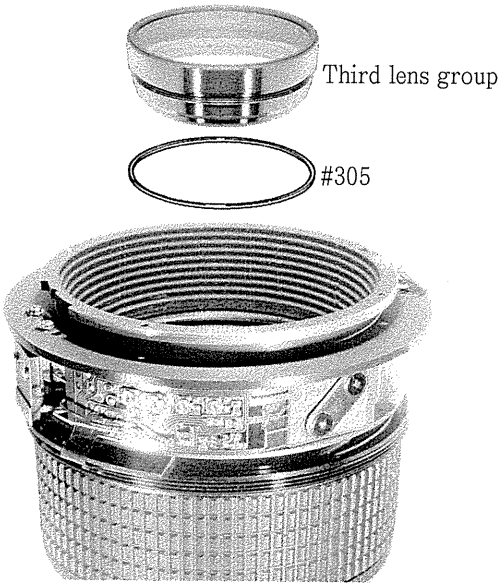
① Insert a 0.06 ～ 0.1mm thick spacer between the LED (index glass) and the glass encoder. Then fasten screws #288 × 2 to secure.

② Move the lens from near to infinity manually to check the gap between the LED (index glass) and the glass encoder and their parallelism.

***Reference:*** Bend #207 to adjust when it is difficult to obtain parallelism.

③ Secure screws #288 × 2 using Screw Lock.

## THIRD LENS GROUP



**Note:** As operation depends on whether or not the third lens unit is present, mount the third lens unit before inspecting lens operation.

## INSPECTING LENS OPERATION

- Mount the lens on the camera body (F90 or F4) and check operation.

**Note:** If no communication is obtained between the camera body and the lens, it is possible that the wiring in the lens is incorrect. Check all wiring.

## ADJUSTMENT

● Items to be adjusted

1. Phase diffierence and position adjustment between the glass encoder and the index glass.
2. Inspection and adjustment of play in the lens driving gear.
3. Inspection of lens driving stop accuracy (overrun) and the lens servo control time.

● Tools to be used

1. J18231 : AF-I lens inspection software
2. J15306 : AF-I lens communication box
3. J15307 : AF-I lens communication adapter
4. Personal computer (NEC PC－9800 series)
5. DC regulated power supplies × 2
6. 4ch digital storage oscilloscope

[ Settings ]

① Inspection equipment

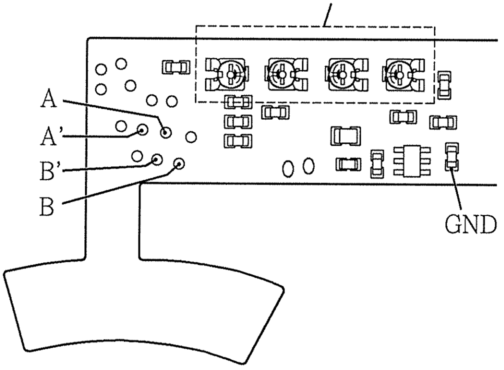
Refer to the specifications for further details.

**Note:** Connect the AF-I lens communication box to the RS-232C interface located on the rear panel of the personal computer.

② Operating voltage

| | Power supply for lens AFmotor | Power supply for AF－I lens communication box |
|---|---|---|
| Overrun inspection | 6.5V ± 0.1 | 5.5V ± 0.2 |
| Servo control stop time inspection | 5.5V ± 0.1 | |
| Scanning time inspection | 6.0V ± 0.1 | |

## 1. Phase difference and position adjustment between the glass encoder and the index glass


Do not touch these parts as they have been factory adjusted.

Position adjustment

① Adjust check lands, as shown in the left-hand figure, and each channel of the oscilloscope so that A, A', B and B' output (sinusoidal) waveforms can be monitored on the oscilloscope.

- Setting oscilloscope (reference values)

| | |
|---|---|
| VOLTS／DIV | 200mV |
| TIME／DIV | 0.5mS |

- Connection of oscilloscope

A ──► 1ch
A' ──► 2ch
B ──► 3ch
B' ──► 4ch

② Inspection of each switch and lens condition from the main menu on the personal computer screen.

③ Turn the focusing ring to check the four waveforms. If the waveforms correspond to one of the items described in the following table, readjust the gap between the index glass and the glass encoder. (Refer to "Adjustment of gap between the LED and the glass encoder".)

| | Phenomenon | Cause | Adjustment |
|---|---|---|---|
| Fig 1. | Amplitude of four waveforms is different. | Gap between the glass encoder and the index glass is not parallel. | Bend #207. |
| Fig 2. | Amplitude of waveforms is abnormally large. There is almost no gap between phases. | No opening between the glass encoder and the index glass. They come into contact. | Check opening and make adjustment once again (0.06 ～ 0.1mm) |
| Fig 3. | Amplitude of for waveforms is abnormally small. | Too great an gap between the glass encoder and the index glass (more than 0.1 mm). | |

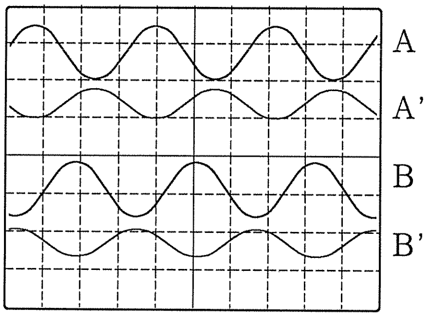


Fig 1.

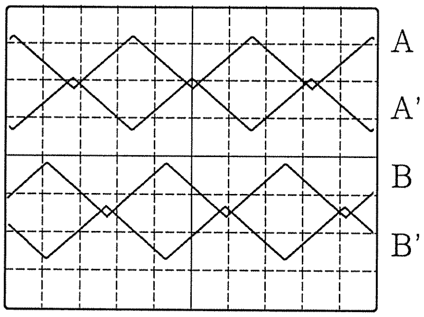


Fig 2.

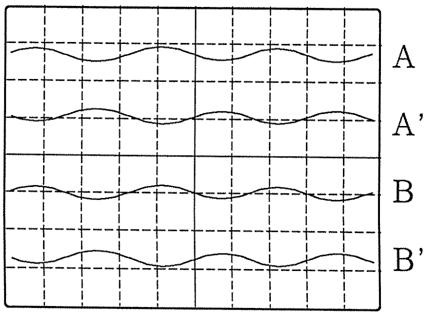
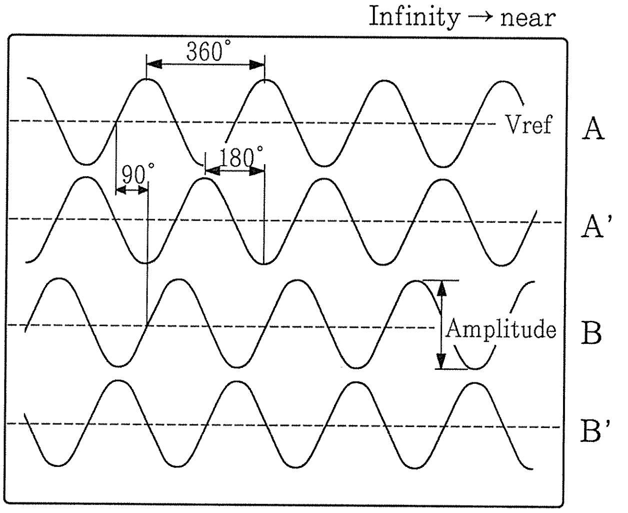


Fig 3.



## Adjustment of phase difference

- Adjust eccentric pins (J15308A, J15308B) so that the waveforms are displayed exactly as shown in the left-hand figure.

① Unfasten screws #282 × 2.

② Turn the focusing ring (from infinity to near) to check waveforms. Adjust eccentric pin 2 so that phase A and phase A' advance phase B and phase B' by 90° .

**Standard value:** Within 90° ± 30°

＊Recommended value: 90° ± 0°

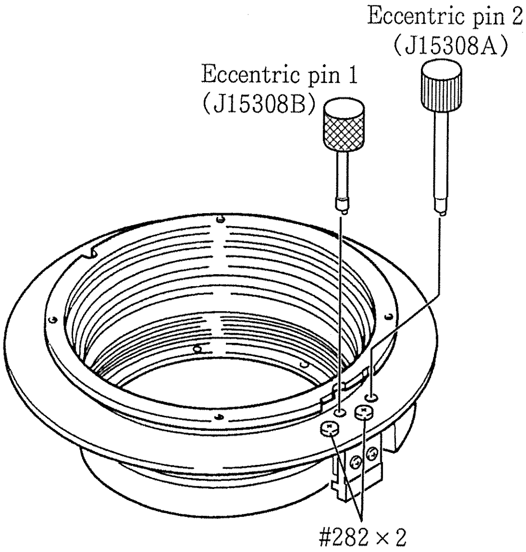
③ Turn the focusing ring (from infinity to near) to check waveforms. Adjust eccentric pin 1 so that the phase between A and A' and the phase between B and B' reverse by 180° .

**Standard value:** Within 180° ± 30°

＊Recommended value: 90° ± 0°

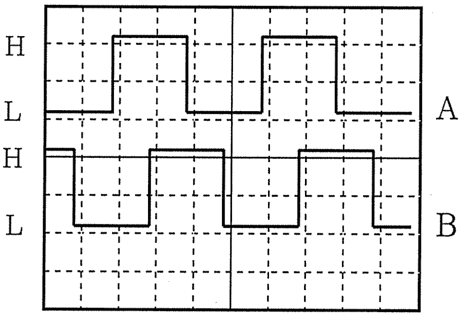
④ Repeat procedures ② and ③ above until the waveforms displayed are as shown in the above left-hand figure.

⑤ After adjustment, fasten screws #282 × 2 and secure them using Screw Lock.



**Note:** Waveform inspection as described above indicates the status when the focusing ring is turned from infinity to near. If the focusing ring is turned reversely (from near to infinity), phase B and phase B' advances 90° against phase A and phase A'.

### Inspection of hot line output



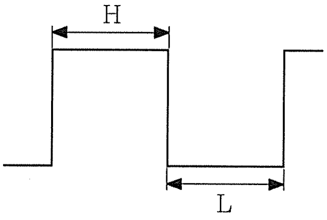
①Connect the H-terminal of the AF-I lens communication box to the 1-ch terminal of the oscilloscope, and connect the E-terminal to the 2-ch terminal.

∘ Setting of oscilloscope (reference value)

| | |
|---|---|
| VOLTS／DIV | 0.5V |
| TIME／DIV | 200mS |

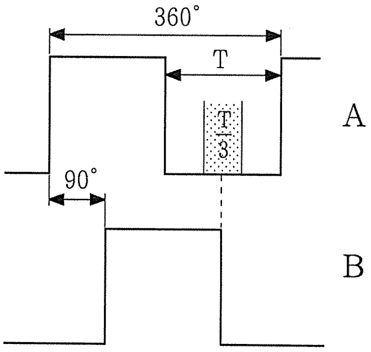
②Select " 4. Inspection of hot line signal out put " from the main menu on the personal computer screen, and select " 4. Inspection of E, H output " from the sub menu.

③Monitor the hot line output while the focusing ring is being turned from infinity to near.



- Check the ratio of H and L for each A and B phase.

  Standard ratio H: L = 1:1 ～ 4:3



- Phase A should advance by 90° against B phase.

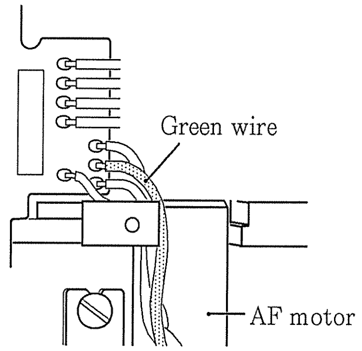
  Standard ratio: Within 90° ± 30°

**Discrimination method:** Edge of waveform in phase B should be within the range of T/3 of waveform in phase A.

**Note:** When the focusing ring is turned from near to infinity, phase B advances by 90° against phase A.

- If the output value is out of the standard value, go back to " 11. Adjustment of phase difference " on page A14 and repeat the adjustment procedures.

## 2. Inspection and adjustment of play in lens driving gear

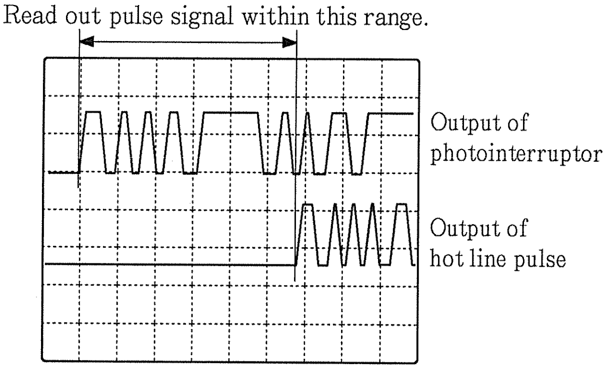


① Connect a green wire from the photointerruptor to the 1-ch of the oscilloscope and connect the E-terminal of the AF-I lens communication box to the 2-ch of the oscilloscope.

○ Setting oscilloscope (reference values)

| | |
|---|---|
| VOLTS／DIV | 0.5V |
| TIME／DIV | 5mS |

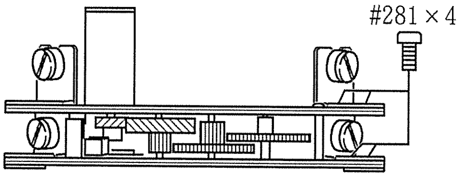
② Select " Inspection of the play in lens driving gear." from the main menu on the personal computer screen, and monitor each waveform while moving the lens from infinity to near according to the instructions on the computer screen.



③ Read out the number of pulses of the photointerruptor until the hot line pulse is output.

**Standard value:** within 10 pulses

***Reference:*** Optimum value can be obtained when pulse numbers are counted from 5 ~ 10.



(AF gear unit)

④ If the value is out of the standard value, unfasten screws #281 × 4 to adjust the mounting position of the AF gear unit.

## 3. Inspection of lens driving stop accuracy (overrun) and the lens servo control time

＊ Choose one of the following inspection items and carry out inspections according to the flowcharts (No. 1 and No. 2).

**Note:** Fix the lens in the horizontal plane when carrying out inspections to eliminate variations due to attitude.

No. 1:
When replacing a cam ring and a guide ring (bearing), or the main FPC, or when replacing parts for repair.

No. 2:
When carrying out lens accuracy inspections if focusing is defective.

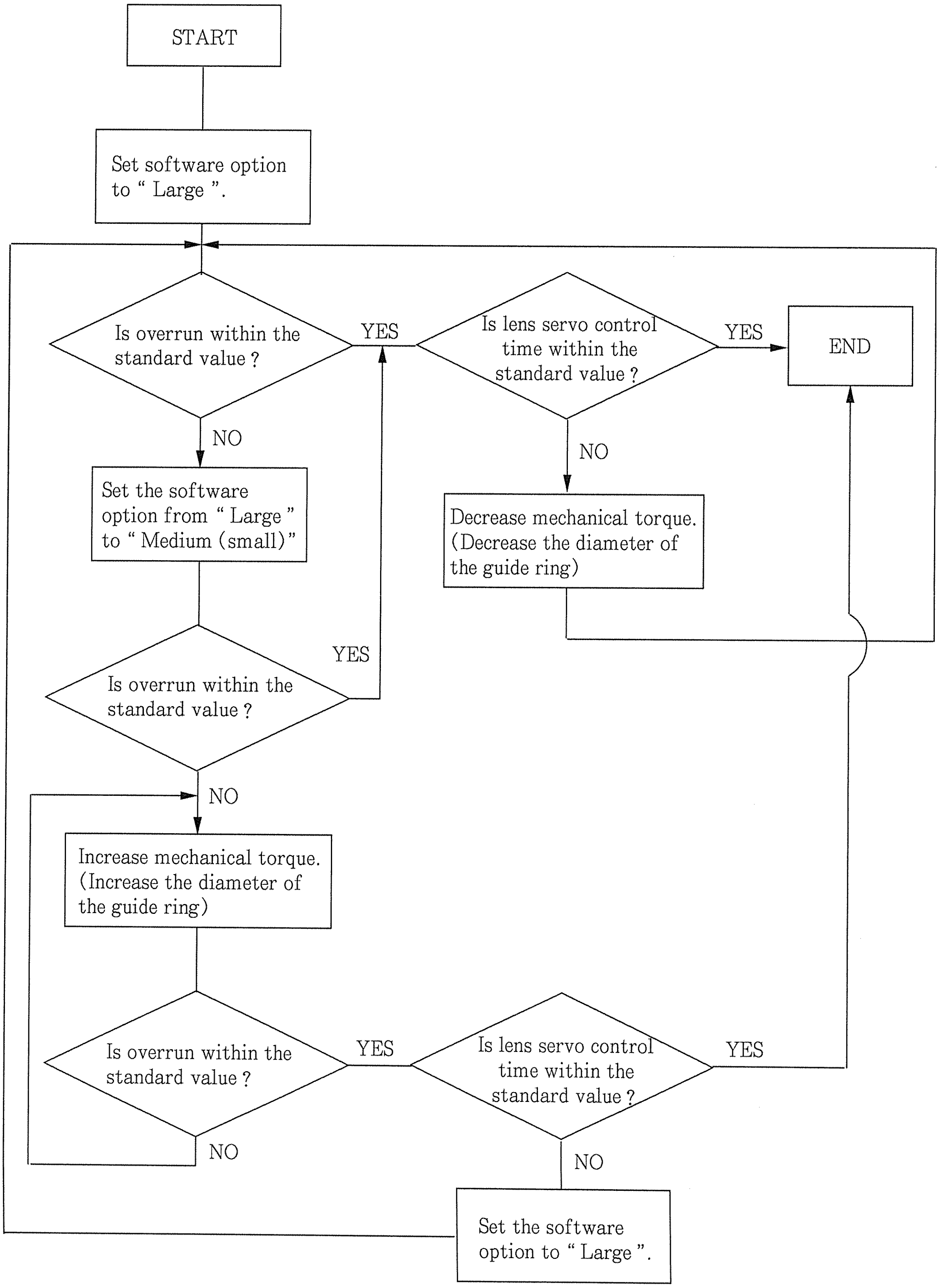
***Reference:*** Relationship between overrun and inspection and adjustment of lens servo control time.

| Contents<br>Adjustment item | Defective in overrun | Defective in lens servo control time. |
|---|---|---|
| Software option | Small Large<br>←------------ | Small Large<br>------------→ |
| Mechanical torque | ( Guide ring, bearing )<br>Small Large<br>------------→ | ( Guide ring, bearing )<br>Small Large<br>←------------ |

＊Occurrence of defective phenomenon decreases according to the direction of the arrows.

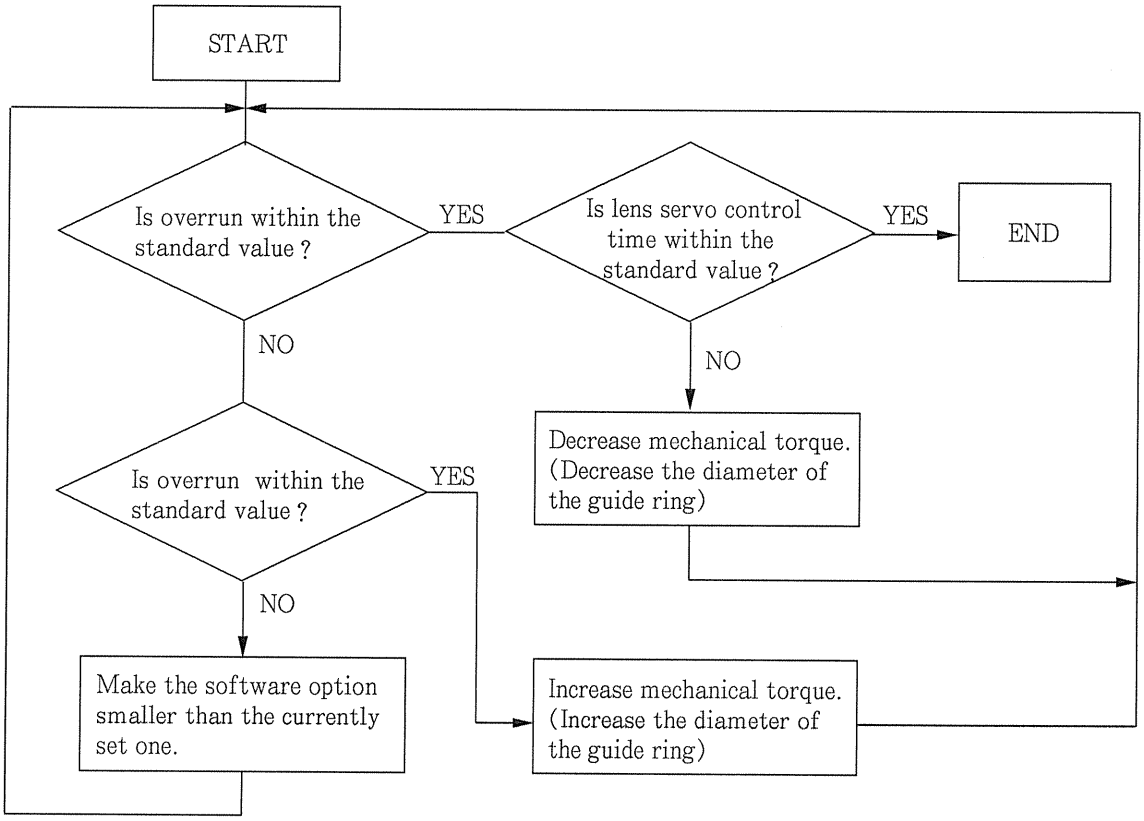
No 1:

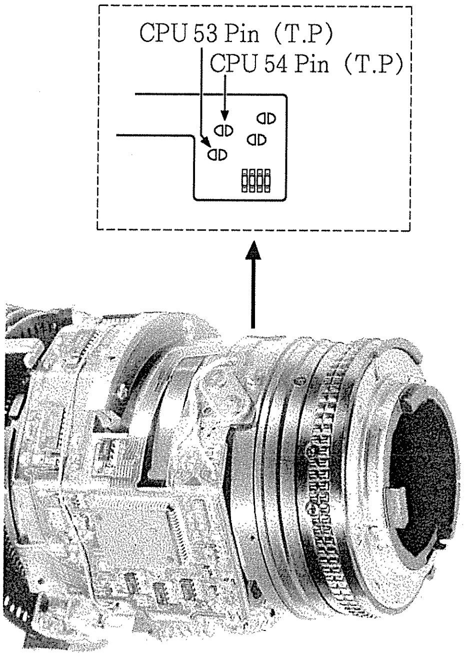
When replacing a cam ring and a guide ring (bearing), or the main FPC, or when replacing parts for repair.


START
Set software option to " Large ".
Is overrun within the standard value ?
YES
NO
Is lens servo control time within the standard value ?
YES
END
NO
Set the software option from " Large " to " Medium (small)"
Decrease mechanical torque. (Decrease the diameter of the guide ring)
YES
Is overrun within the standard value ?
NO
Increase mechanical torque. (Increase the diameter of the guide ring)
Is overrun within the standard value ?
YES
Is lens servo control time within the standard value ?
YES
NO
NO
Set the software option to " Large ".

No 2:

When carrying out lens accuracy inspections if focusing is defective.

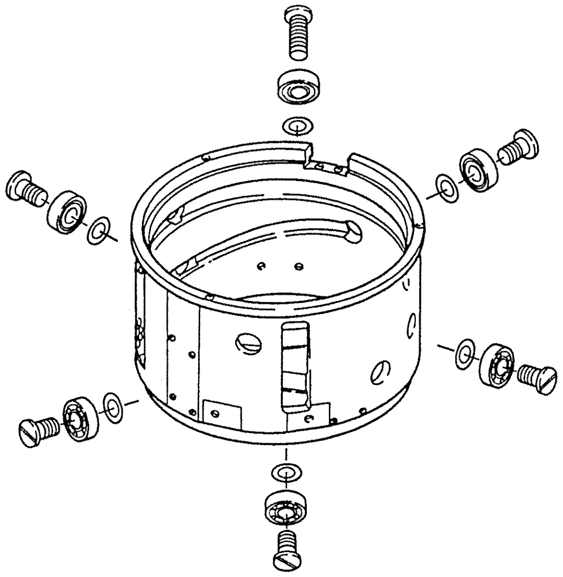

START
Is overrun within the standard value ?
YES
Is lens servo control time within the standard value ?
YES
END
NO
NO
Decrease mechanical torque. (Decrease the diameter of the guide ring)
Is overrun within the standard value ?
YES
NO
Make the software option smaller than the currently set one.
Increase mechanical torque. (Increase the diameter of the guide ring)



① Software option adjustment

- Software option adjustment is available on CPU ver. 2.15 or later.
- As shown in the table below, adjust software option by short-circuiting the test pattern (T.P.) between pin 53 and pin 54 of the CPU using a solder bridge.

| 53 Pin (T.P) | 54 Pin (T.P) | Software class |
|---|---|---|
| Short-circuit | Short-circuit | Small |
| Open circuit | Short-circuit | ⋮ |
| Open circuit | Open circuit | Large |

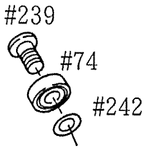


② Mechanical torque adjustment

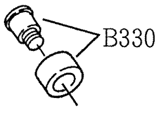
- Set bearings ×6 or bearings ×3 and guide rings ×3 to adjust mechanical torque.

- To set the torque to the minimum value, use bearings at all six places. To make the torque greater, choose the larger diameter guide ring from the combination of bearings ×3 and guide rings ×3.

**Note:** Mount bearings and guide rings alternately when using them in combination.



(Bearing)



(Guide ring)

○ Types and dimensions of guide rings

| Parts No | Dimensions |
|---|---|
| 1B999－534 | $5^{+0.04}_{+0.03}$ mm |
| 1B999－535 | $5^{+0.03}_{+0.02}$ mm |
| 1B999－536 | $5^{+0.02}_{+0.01}$ mm |
| 1B999－537 | $5^{+0.01}_{0}$ mm |
| 1B999－538 | $5^{0}_{-0.01}$ mm |

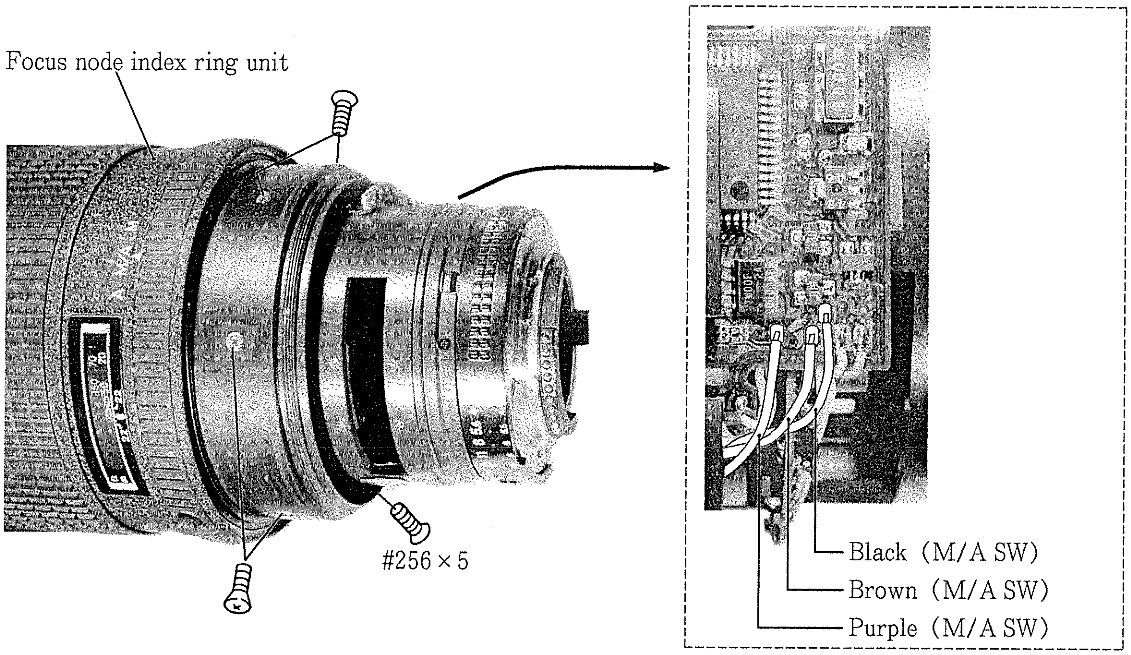
- If accuracy cannot be obtained when mechanical torque adjustment has been carried out on CPU ver. 2.14, replace CPU ver. 2.14 with CPU ver. 2.20, and carry out adjustments described in No. 1 above.

## When replacing a part listed below, some adjustment and inspection may be requirwd

| Item to be check and adjusted / Parts replaced | | Inspection and adjustment of the glass encoder unit | | Inspection of play in the lens driving gear | Inspection of accuracy in halting of the lens drive (overrun) ＊1. | Inspection of lens servo control time ＊1. |
|---|---|---|---|---|---|---|
| | | Phase difference | Output signal adjustment | | | |
| Assembly | Main FPC Ver ～2.14 | | | | | |
| | Main FPC Ver 2.15～ | | | | ○ | ○ |
| | HIC FPC | ○ | ○ | | ○ | ○ |
| | AF connecting FPC | | | | | |
| | Relay FPC | ○ | ○ | | ○ | ○ |
| | Distance encoder | | | | | |
| | Glass encoder | ○ | ○ | | ○ | ○ |
| | DC／DC converter | | | | | |
| Part | CPU (Ver ～2.14) | | | | | |
| | CPU (Ver 2.15～) | | | | ○ | ○ |
| | AF driving motor | | | ○ | | |
| | Photo interrupter (P.I) | | | ○ | | |
| | MD IC | | | | | |
| | Guide ring or bearing | | | | ○ | ○ |
| | Focus ring | ○ | ○ | | ○ | ○ |

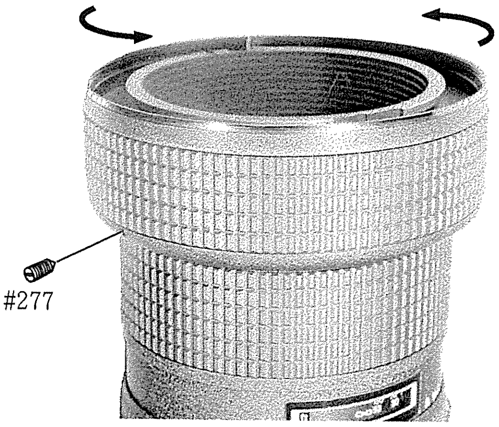
＊1. Adjustment is possible with software option for CPU ver. 2.15 or later for the 300／2.8 lens.

## FOCUS MODE INDEX RING UNIT


Focus node index ring unit
#256 × 5
Black (M/A SW)
Brown (M/A SW)
Purple (M/A SW)

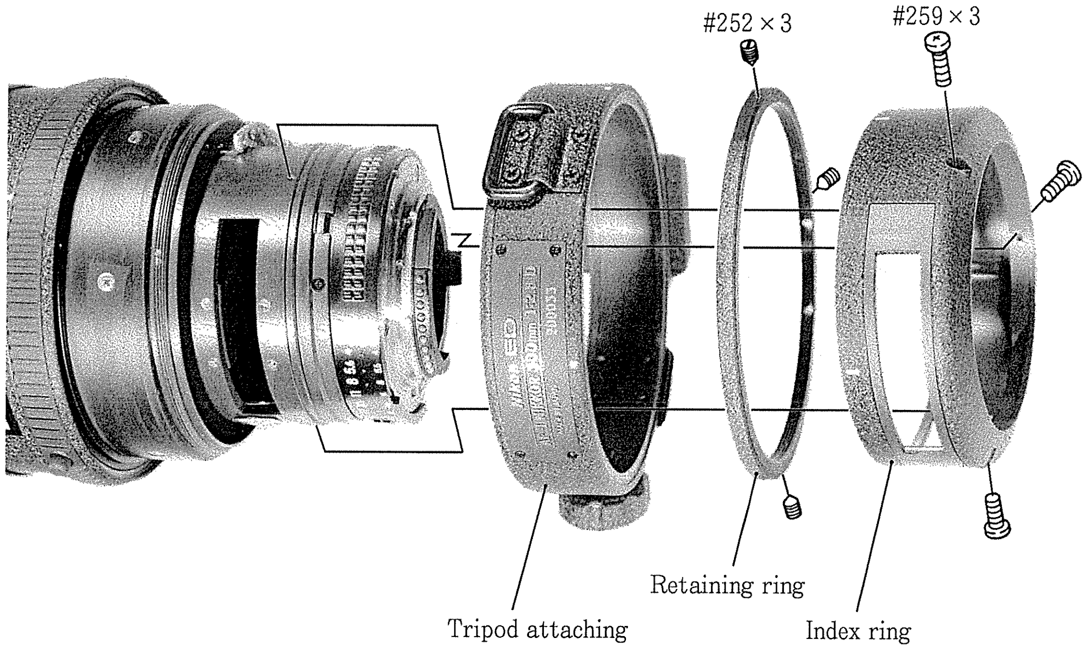
- Mount the focus mode index ring at the position where the focus mode selector is set to " M／A ".

## FOCUS RING

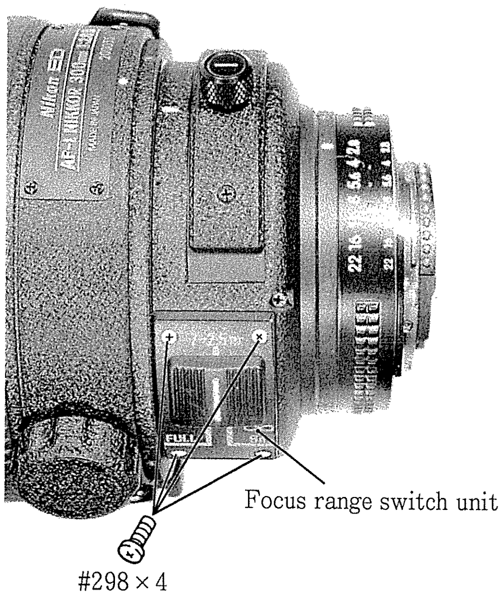


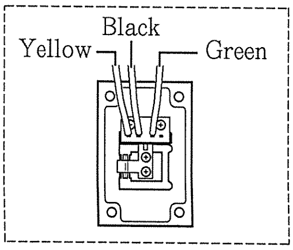
- Mount the focusing ring and secure it with screw #277.

## INDEX RING, TRIPOD ATTACHING, RETAINING RING

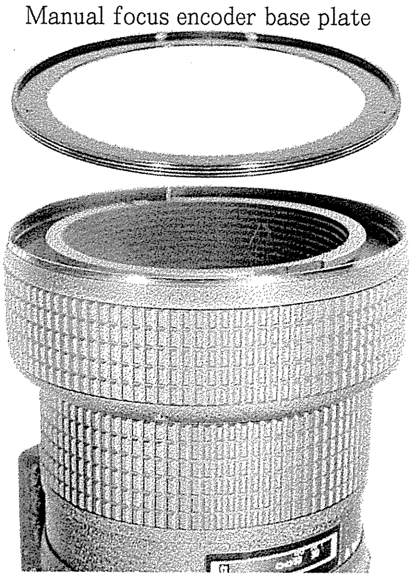

#252 × 3
#259 × 3
Retaining ring
Tripod attaching
Index ring

## FOCUS RANGE SWITCH UNIT

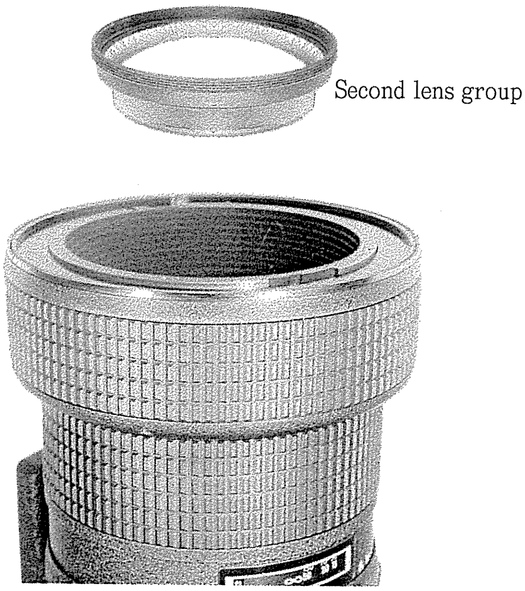

Focus range switch unit
#298 × 4


Black
Yellow
Green

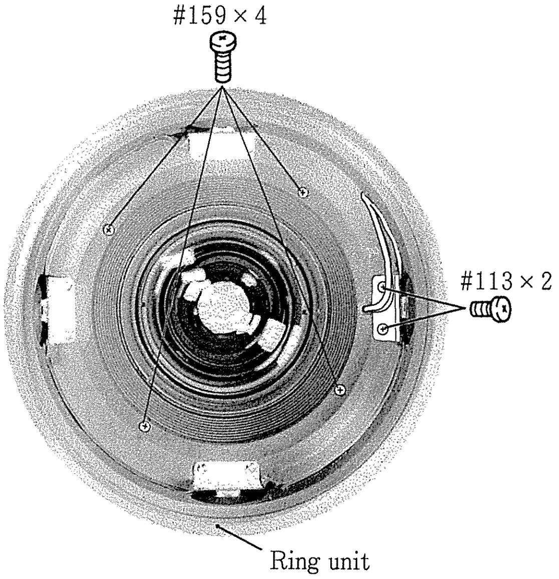
## MANUAL FOCUS ENCODER BASE PLATE

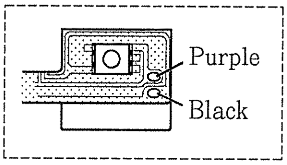

Manual focus encoder base plate

## SECOND LENS GROUP

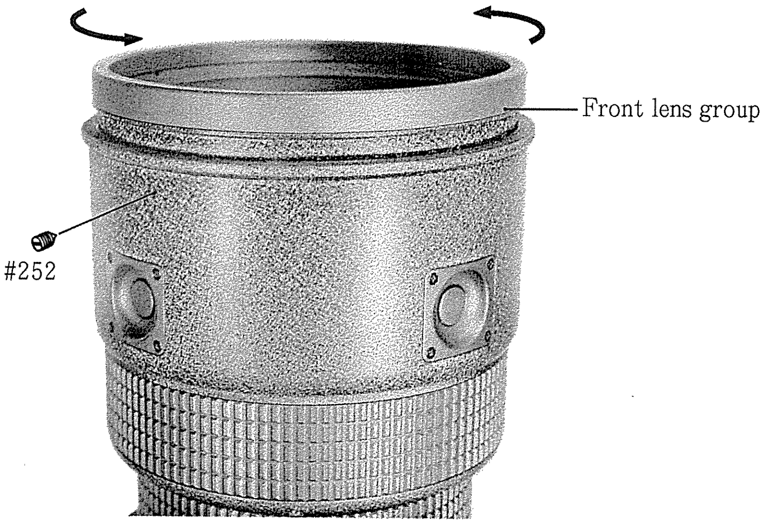

Second lens group

## RING UNIT, FOCUS LOCK FPC UNIT


#159 × 4
#113 × 2
Ring unit


Purple
Black

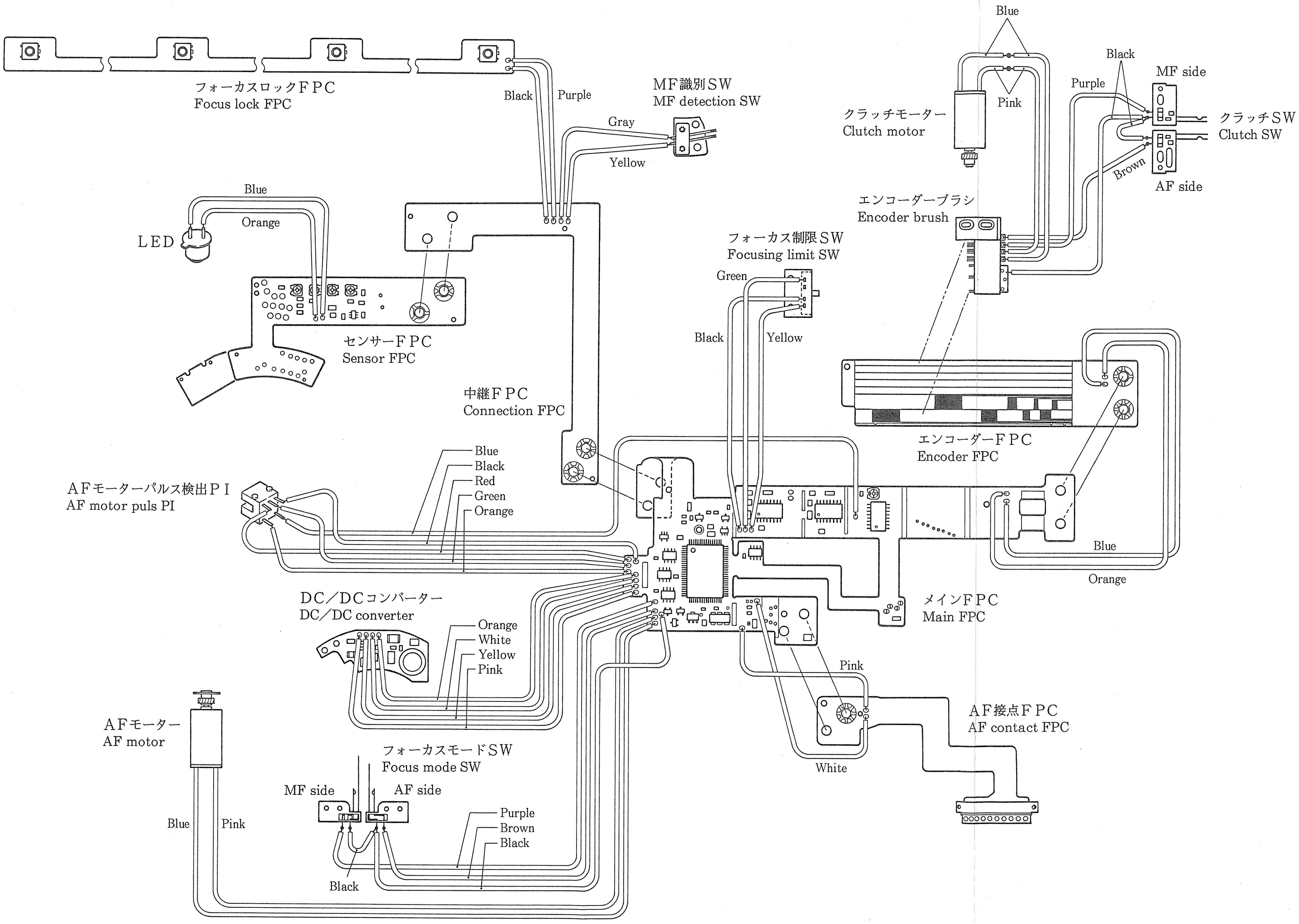
## FRONT LENS GROUP


Front lens group
#252

INC

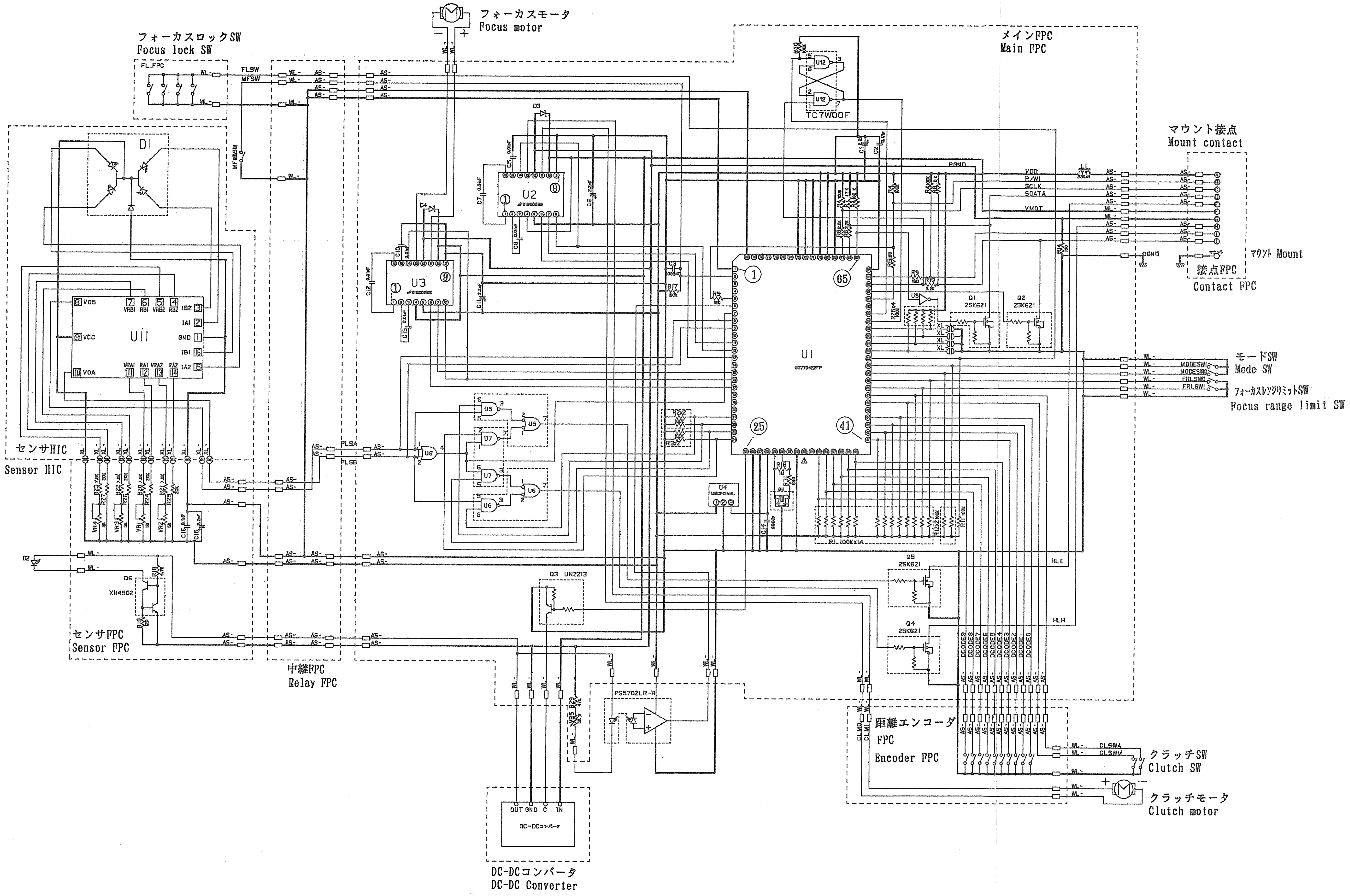
# AF-I Nikkor ED 300mm f/2.8 D IF

## 実体配線図／WIRING DIAGRAM


フォーカスロックＦＰＣ
Focus lock FPC
Black
Purple
ＭＦ識別ＳＷ
MF detection SW
Gray
Yellow
Blue
Pink
クラッチモーター
Clutch motor
Black
Purple
MF side
クラッチＳＷ
Clutch SW
Brown
AF side
エンコーダーブラシ
Encoder brush
Blue
Orange
ＬＥＤ
センサーＦＰＣ
Sensor FPC
フォーカス制限ＳＷ
Focusing limit SW
Green
Black
Yellow
中継ＦＰＣ
Connection FPC
エンコーダーＦＰＣ
Encoder FPC
Blue
Black
Red
Green
Orange
ＡＦモーターパルス検出ＰＩ
AF motor puls PI
Blue
Orange
メインＦＰＣ
Main FPC
ＤＣ／ＤＣコンバーター
DC／DC converter
Orange
White
Yellow
Pink
Pink
ＡＦ接点ＦＰＣ
AF contact FPC
White
ＡＦモーター
AF motor
フォーカスモードＳＷ
Focus mode SW
MF side
AF side
Blue
Pink
Purple
Brown
Black
Black

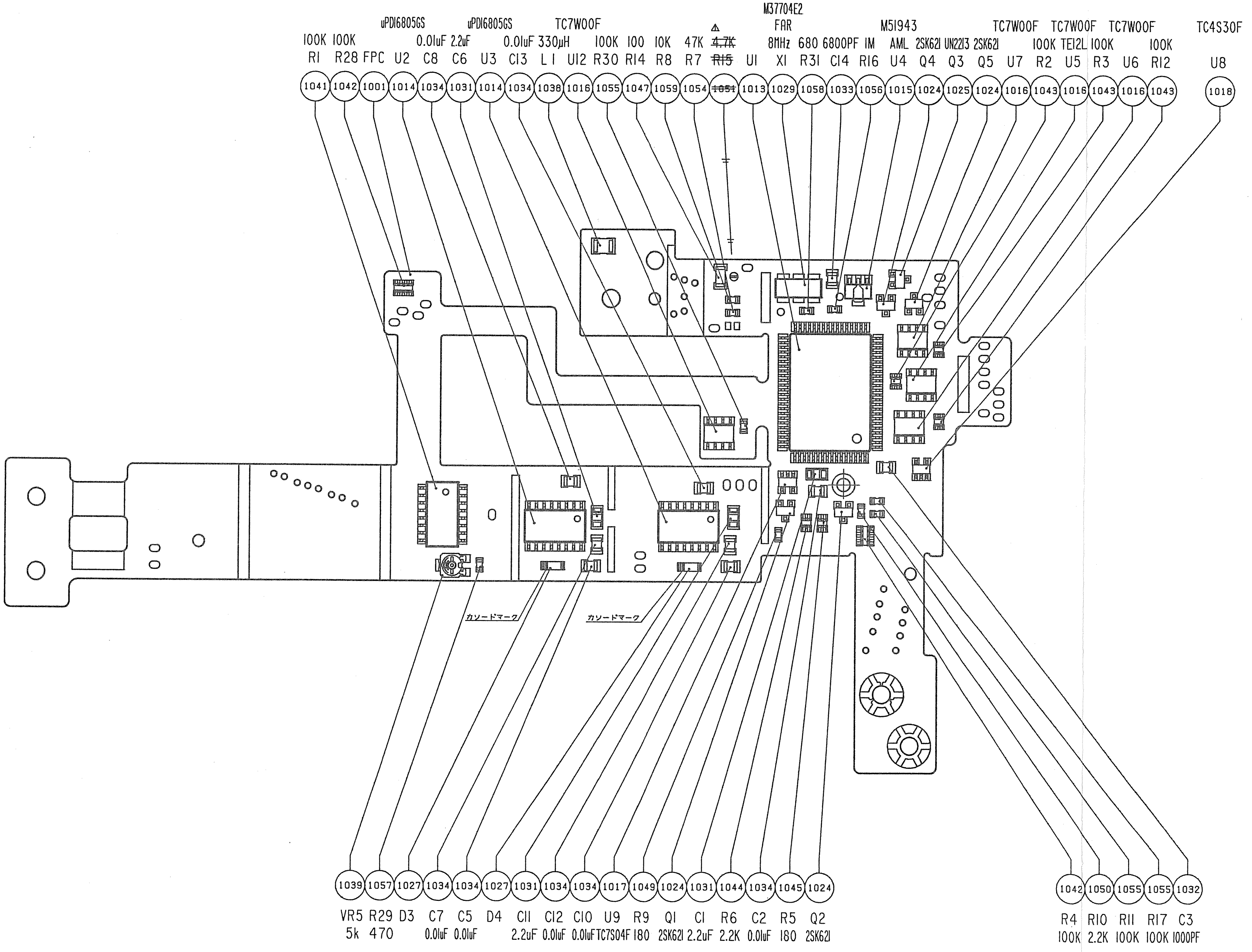
差し替え／Change page

# 回路図 Circuit Diagram


フォーカスモータ
Focus motor
フォーカスロックSW
Focus lock SW
FL.FPC
FLSW
MFSW
MFSW
D1
U11
VOB
VCC
VOA
VRB1
RB1
VRB2
RB2
IB2
IA1
GND
IB1
IA2
VRA1
RA1
VRA2
RA2
センサHIC
Sensor HIC
センサFPC
Sensor FPC
D2
Q6
XN4502
中継FPC
Relay FPC
PLSA
PLSB
U2
U3
D3
D4
U5
U6
U7
U8
Q3 UN2213
メインFPC
Main FPC
U12
TC7W00F
U1
PGND
VDD
R/WI
SCLK
SDATA
VMOT
マウント接点
Mount contact
マウント Mount
接点FPC
Contact FPC
Q1
2SK621
Q2
2SK621
U9
U4
Q5
2SK621
Q4
2SK621
HLE
HLH
モードSW
Mode SW
MODESW1
MODESW0
FRLSW0
FRLSW1
フォーカスレンジリミットSW
Focus range limit SW
PS5702LR-R
DC-DCコンバータ
OUT GND C IN
DC-DC Converter
距離エンコーダ
FPC
Encoder FPC
CLMO
CLM1
CLSWA
CLSWM
クラッチSW
Clutch SW
クラッチモータ
Clutch motor

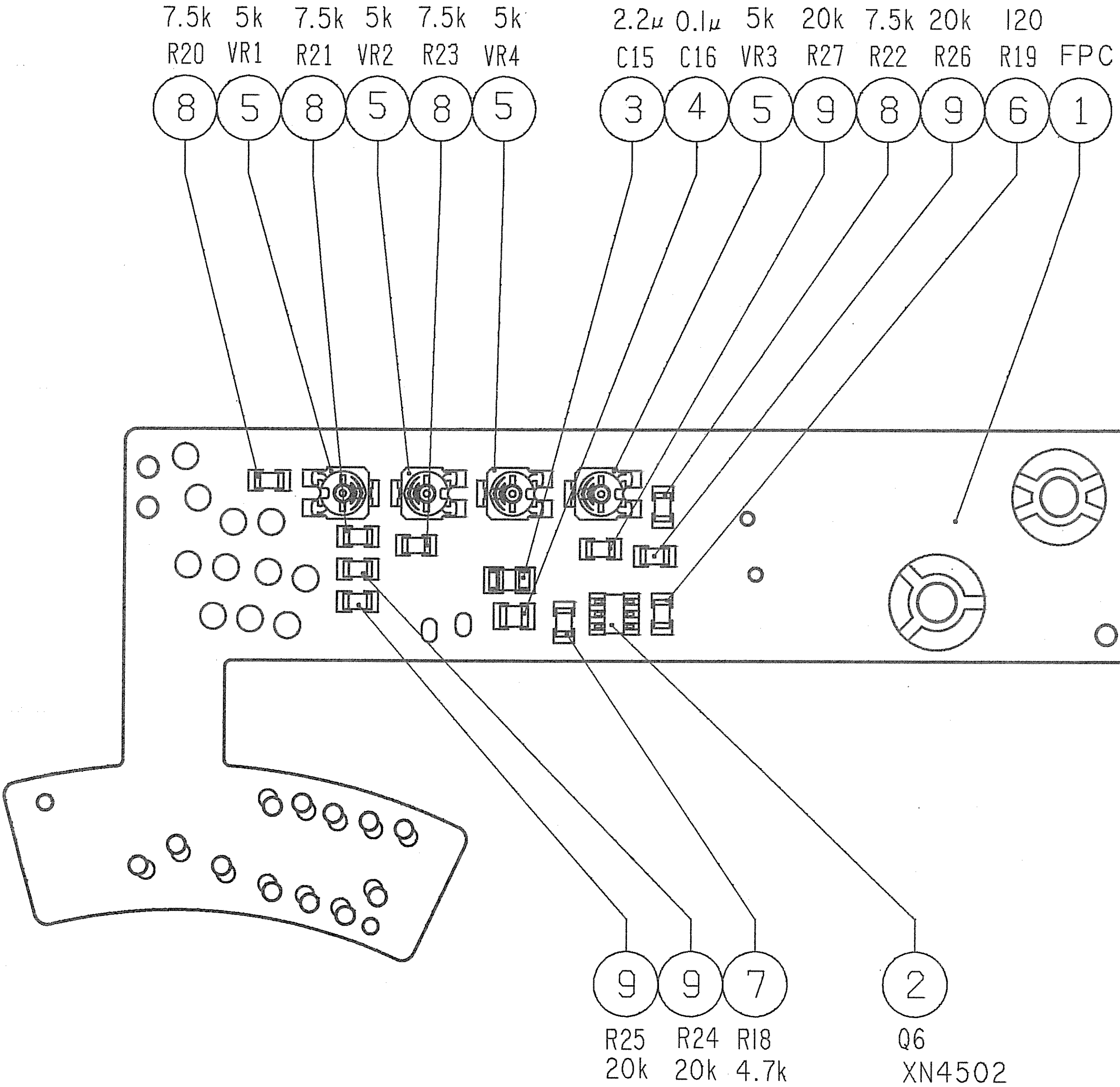
INC

# MAIN FPC


100K R1 1041
100K R28 1042
FPC 1001
uPD16805GS U2 1014
0.01uF C8 1034
2.2uF C6 1031
uPD16805GS U3 1014
0.01uF C13 1034
330μH L1 1038
TC7W00F U12 1016
100K R30 1055
100 R14 1047
10K R8 1059
47K R7 1054
⚠ ~~4.7K~~ ~~R15~~ ~~1051~~
M37704E2 U1 1013
FAR 8MHz X1 1029
680 R31 1058
6800PF C14 1033
1M R16 1056
M51943 AML U4 1015
2SK621 Q4 1024
UN2213 Q3 1025
2SK621 Q5 1024
TC7W00F U7 1016
100K R2 1043
TC7W00F TE12L U5 1016
100K R3 1043
TC7W00F U6 1016
100K R12 1043
TC4S30F U8 1018
カソードマーク
カソードマーク
1039 VR5 5k
1057 R29 470
1027 D3
1034 C7 0.01uF
1034 C5 0.01uF
1027 D4
1031 C11 2.2uF
1034 C12 0.01uF
1034 C10 0.01uF
1017 U9 TC7S04F
1049 R9 180
1024 Q1 2SK621
1031 C1 2.2uF
1044 R6 2.2K
1034 C2 0.01uF
1045 R5 180
1024 Q2 2SK621
1042 R4 100K
1050 R10 2.2K
1055 R11 100K
1055 R17 100K
1032 C3 1000PF

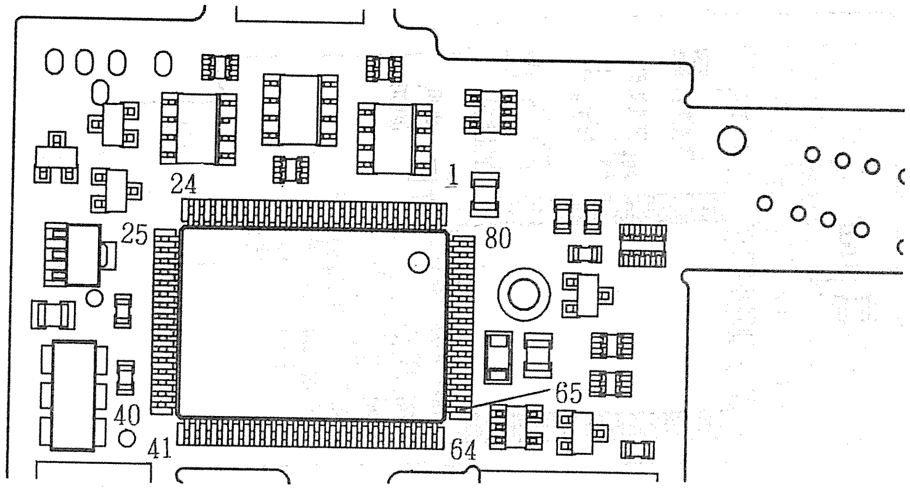
INC

# LED FPC


7.5k
R20
8
5k
VR1
5
7.5k
R21
8
5k
VR2
5
7.5k
R23
8
5k
VR4
5
2.2μ
C15
3
0.1μ
C16
4
5k
VR3
5
20k
R27
9
7.5k
R22
8
20k
R26
9
120
R19
6
FPC
1
9
R25
20k
9
R24
20k
7
R18
4.7k
2
Q6
XN4502

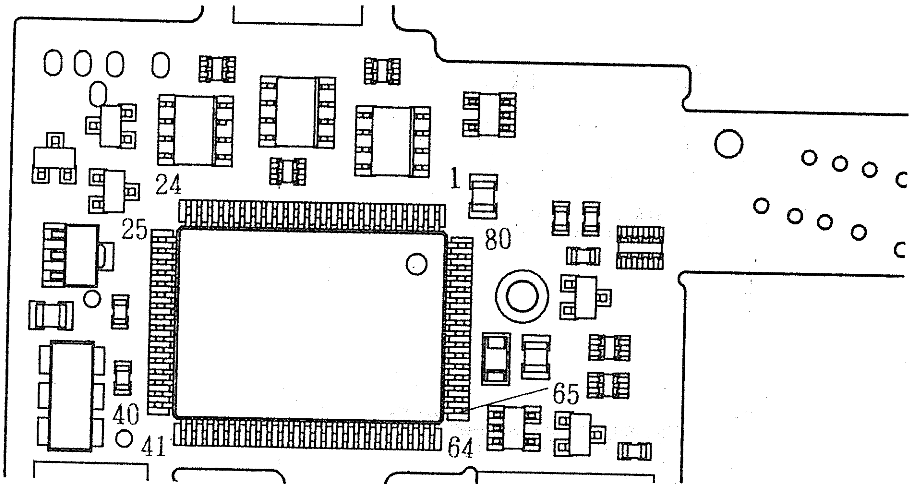
# ＩＣピン配置表

## Ｕ１　ＣＰＵ（Ｍ３７７０４Ｅ２ＦＰ）



| NO | 名称及び内容 | NO | 名称及び内容 |
|---|---|---|---|
| 1 | P70　レンズ識別　０ | 41 | P23　距離信号　３ |
| 2 | P67　ＭＦ環作動検出 | 42 | P22　距離信号　２ |
| 3 | P66　Ｎ．Ｃ． | 43 | P21　距離信号　１ |
| 4 | P65　Ｎ．Ｃ． | 44 | P20　距離信号　０ |
| 5 | P64　Ｒ／Ｗ | 45 | P17　Ｎ．Ｃ． |
| 6 | P63　インタラプタ出力 | 46 | P16　クラッチスイッチ　Ｍ |
| 7 | P62　Ｅｘ　ＯＲ出力 | 47 | P15　クラッチスイッチ　Ａ |
| 8 | P61　ガラスエンコーダＢ相 | 48 | P14　フォーカスレンジ切換　１ |
| 9 | P60　ガラスエンコーダＡ相 | 49 | P13　フォーカスレンジ切換　０ |
| 10 | P57　Ｎ．Ｃ． | 50 | P12　モードスイッチ　０（Ａ） |
| 11 | P56　クラッチモーター駆動出力１ | 51 | P11　モードスイッチ　１（Ｍ） |
| 12 | P55　クラッチモーター駆動許可 | 52 | P10　フォーカスロックスイッチ |
| 13 | P54　クラッチモーター駆動出力２ | 53 | P07　調整端子　１ |
| 14 | P53　Ｎ．Ｃ． | 54 | P06　調整端子　２ |
| 15 | P52　ＡＦモーターＰＷＭ出力１ | 55 | P05　オプション　１ |
| 16 | P51　ＡＦモーター駆動許可 | 56 | P04　オプション　０ |
| 17 | P50　ＡＦモーターＰＷＭ出力０ | 57 | P03　ＴＣ用ＦＦ出力 |
| 18 | P47　Ｎ．Ｃ． | 58 | P02　ＴＣ用ＦＦリセット |
| 19 | P46　Ｎ．Ｃ． | 59 | P01　Ｎ．Ｃ． |
| 20 | P45　Ｎ．Ｃ． | 60 | P00　Ｒ／Ｗ |
| 21 | P44　Ｈ接点コントロール０ | 61 | P87　ＴＣ　ＯＵＴ |
| 22 | P43　Ｅ接点コントロール０ | 62 | P86　ＴＣ　ＩＮ |
| 23 | P42　Ｈ接点コントロール１ | 63 | P85　ＴＣ　ＣＬＫ |
| 24 | P41　Ｅ接点コントロール１ | 64 | P84　ＧＮＤ |
| 25 | P40　ＤＣ－ＤＣコントロール | 65 | P83　シリアルＯＵＴ |
| 26 | BYTE　ＧＮＤ | 66 | P82　シリアルＩＮ |
| 27 | CNVss　ＧＮＤ | 67 | P81　シリアルＣＬＫ |
| 28 | RESET　リセット | 68 | P80　ＧＮＤ |
| 29 | Xin　発振子 | 69 | Vdd　Ｖｄｄ |
| 30 | Xout　発振子 | 70 | AVcc　Ｖｄｄ |
| 31 | E　Ｎ．Ｃ． | 71 | Vref　ＧＮＤ |
| 32 | Vss　ＧＮＤ | 72 | AVss　ＧＮＤ |
| 33 | P33　Ｎ．Ｃ． | 73 | Vss　ＧＮＤ |
| 34 | P32　Ｎ．Ｃ． | 74 | P77　Ｎ．Ｃ． |
| 35 | P31　距離信号９ | 75 | P76　Ｎ．Ｃ． |
| 36 | P30　距離信号８ | 76 | P75　Ｎ．Ｃ． |
| 37 | P27　距離信号７ | 77 | P74　Ｎ．Ｃ． |
| 38 | P26　距離信号６ | 78 | P73　Ｎ．Ｃ． |
| 39 | P25　距離信号５ | 79 | P72　Ｎ．Ｃ． |
| 40 | P24　距離信号４ | 80 | P71　レンズ識別　１ |

U1 CPU (M37704E2FP)



| NO | Terminals | NO | Terminals |
|---|---|---|---|
| 1 | P70 Lens Type Signal 0 | 41 | P23 Distance Signal 3 |
| 2 | P67 MF Ring Moving Detector | 42 | P22 Distance Signal 2 |
| 3 | P66 N. C. | 43 | P21 Distance Signal 1 |
| 4 | P65 N. C. | 44 | P20 Distance Signal 0 |
| 5 | P64 Read／Wright | 45 | P17 N. C. |
| 6 | P63 Interruputer Output | 46 | P16 Crutch Switch M |
| 7 | P62 Exclusive OR OUTPUT | 47 | P15 Crutch Switch A |
| 8 | P61 Glass Encoder Phase"B" | 48 | P14 Focus Range Change Switch 1 |
| 9 | P60 Glass Encoder Phase"A" | 49 | P13 Focus Range Change Switch 0 |
| 10 | P57 N. C. | 50 | P12 Mode SWitch 0 (A) |
| 11 | P56 Crutch Motor Drive Output 1 | 51 | P11 Mode Switch 1 (M) |
| 12 | P55 Crutch Motor Drive Enable | 52 | P10 Focus Lock Switch |
| 13 | P54 Crutch Motor Drive Output 2 | 53 | P07 Adjustment Terminal 1 |
| 14 | P53 N. C. | 54 | P06 Adjustment Terminal 0 |
| 15 | P52 AF Motor PWM Output 1 | 55 | P05 Option Terminal 1 |
| 16 | P51 AF Motor Drive Enable | 56 | P04 Option Terminal 0 |
| 17 | P50 AF Motor PWM Output 0 | 57 | P03 FlipFlop Output for TC |
| 18 | P47 N. C. | 58 | P02 FlipFlop Reset for TC |
| 19 | P46 N. C. | 59 | P01 N. C. |
| 20 | P45 N. C. | 60 | P00 Read／Wright |
| 21 | P44 HTerminal Control0 | 61 | P87 TC OUT |
| 22 | P43 ETerminal Control0 | 62 | P86 TC IN |
| 23 | P42 HTerminal Control1 | 63 | P85 TC CLK |
| 24 | P41 HTerminal Control1 | 64 | P84 GND |
| 25 | P40 DC-DC Converter Control | 65 | P83 Serial Output |
| 26 | BYTE GND | 66 | P82 Serial Input |
| 27 | CNVss GND | 67 | P81 Serial Clock |
| 28 | RESET | 68 | P80 GND |
| 29 | Xin Oscilator | 69 | Vdd Vdd |
| 30 | Xout Oscilator | 70 | AVcc Vdd |
| 31 | E N. C. | 71 | Vref GND |
| 32 | Vss GND | 72 | AVss GND |
| 33 | P33 N. C. | 73 | Vss GND |
| 34 | P32 N. C. | 74 | P77 N. C. |
| 35 | P31 Distance Signal 9 | 75 | P76 N. C. |
| 36 | P30 Distance Signal 8 | 76 | P75 N. C. |
| 37 | P27 Distance Signal 7 | 77 | P74 N. C. |
| 38 | P26 Distance Signal 6 | 78 | P73 N. C. |
| 39 | P25 Distance Signal 5 | 79 | P72 N. C. |
| 40 | P24 Distance Signal 4 | 80 | P71 Lens Type Signal1 |

# 部品対照表 Parts Reference Table

| 補助番号 Auxiliary No. | 部品番号 Part Number | 補助番号 Auxiliary No. | 部品番号 Part Number | 補助番号 Auxiliary No. | 部品番号 Part Number |
|---|---|---|---|---|---|
| G1 | 1G713-020 | 45 | 1K521-171 | 84 | 1K681-475 |
| G2 | 1G156-052 | 46 | 1K521-172 | 85 | 1K208-143 |
| G3 | 1G115-051 | 47 | 1K641-169 | 86 | 1K681-453 |
| G4 | 1G216-026 | 48 | 1K521-173 | 87 | 1K240-829 |
| G5 | 1G252-037 | 49 | 1K500-836 | 88 | 1K611-733 |
| G6 | 1G152-062 | 50 | 1K500-837 | 89 | 1K204-004-1 |
| G7 | 1G153-064 | 51 | 1K611-731 | 90 | 1K130-495 |
| G8 | 1G213-031 | 52 | 1K611-711 | 91 | 1K680-024 |
| G9 | 1G212-017 | 53 | 1K611-712 | 92 | 1K480-001-1 |
| G10 | 1G113-085 | 54 | 1K117-429 | 93 | 1K500-082-2 |
| G11 | 1G253-037 | 55 | 1K240-826 | 94 | 1K681-476 |
| G12 | 1G154-117 | 56 | 1K240-827 | 95 | 1K120-219 |
| G13 | 1G610-002-1 | 57 | 1K470-094 | 96 | 1K225-067-1 |
| G14 | 1G766-001 | 58 | 1K485-207 | 97 | 1K681-477 |
| G15 | 1G767-001 | 59 | 1K117-403 | 98 | 1K240-835 |
|  |  | 60 | 1K515-236 | 99 | 1K133-007 |
| 21 | 1K300-071-1 | 61 | 1K521-174 | 100 | 1K680-843 |
| 23 | 1K314-270 | 62 | 1K521-175 | 101 | 1K340-133 |
| 24 | 1K530-067 | 63 | 1K681-450 | 102 | 1K371-706 |
| 25 | 1K510-404 | 64 | 1K681-451 | 103 | 1K220-021-1 |
| 26 | 1K475-494 | 66 | 1K641-170 | 104 | 1S800-001-1 |
| 27 | 1K302-066 | 67 | 1K641-171 | 105 | 1K485-152-1 |
| 28 | 1K475-401-1 | 68 | 1S700-344 | 106 | 1K110-385 |
| 29 | 1K630-802 | 69 | 1K400-342 | 107 | 1K611-714 |
| 30 | 1K404-114 | 70 | 1K380-045-2 | 108 | B1-17020FA |
| 31 | 1K570-074 | 71 | 1K681-474 | 109 | 1K240-830 |
| 32 | 1K370-111-1 | 73 | 1K240-828 | 110 | 1K611-716 |
| 33 | 1K574-114 | 74 | 1K070-022 | 111 | 1K641-173 |
| 34 | 1K572-159 | 75 | 1K611-732 | 112 | 1K260-620 |
| 35 | 1K641-167 | 76 | 1K340-231 | 113 | B1-17028FA |
| 36 | 1K240-790 | 77 | 1K126-102 | 114 | 1K160-056-1 |
| 37 | 1K110-383 | 78 | 1K641-172 | 115 | 1K681-478 |
| 38 | 1K641-168 | 79 | 1K600-563 | 116 | A1-17035FA |
| 39 | 1K630-803 | 80 | 1K521-176 | 117 | 1K641-174 |
| 41 | 1K630-804 | 81 | 1K310-008-1 | 118 | 1K521-177 |
| 42 | 1K521-169 | 82 | 1K640-671 | 119 | 1K246-090 |
| 43 | 1K500-835 | 83 | 1K610-843 | 120 | 1K120-036-1 |
| 44 | 1K521-170 |  |  |  |  |

## 部品対照表　Parts Reference Table

| 補助番号 Auxiliary No. | 部品番号 Part Number | 補助番号 Auxiliary No. | 部品番号 Part Number | 補助番号 Auxiliary No. | 部品番号 Part Number |
|---|---|---|---|---|---|
| 121 | 1K371-759 | 167 | 1K641-175 | 198 | 1K641-160 |
| 122 | A1-17055FA | 168 | 1K641-176 | 199 | 1K314-271-1 |
| 124 | 1K130-304 | 170 | 1K611-736 | 200 | 1K611-751 |
| 125 | 1K120-091 | 171 | 1K611-718 | 201 | 1K240-831 |
|  | 1K120-007-2 | 172 | 1K208-097 | 203 | 1K117-407 |
| 126 | 1K120-018 | 173 | 1K240-563 | 204 | 1K601-220 |
| 127 | 1K120-010-1 | 174 | 1K233-008-2 | 205 | 1K681-462 |
| 128 | 1K110-037 | 175 | 1K521-178 | 206 | 1K681-463 |
| 129 | 1K120-012 | 176 | 1K110-384 | 207 | 1K611-721 |
| 130 | 1K115-105 | 177 | 1K161-151 | 208 | A1-17020FA |
| 131 | 1K600-043 |  | 1K161-152 | 209 | 1K611-739 |
| 132 | 1K370-115 |  | 1K161-153 | 210 | 1B060-498 |
| 133 | 1K370-116 |  | 1K161-154 | 211 | 1K601-182 |
| 134 | 1K370-117 |  | 1K161-155 | 212 | 1K601-183 |
| 135 | 1K100-031 |  | 1K161-156 | 213 | 1K371-708 |
| 136 | 1K681-454 |  | 1K161-157 | 214 | P3-10050SX |
| 137 | 1K630-819 | 178 | 1K640-672-1 | 216 | B1-17070FA |
| 138 | R5-02000FA | 179 | 1K161-158 | 217 | 1K120-075 |
| 139 | 1K001-002-1 | 180 | 1K117-465 | 218 | R1-02600FA |
| 140 | 1K611-734 | 181 | 1K260-621 | 222 | A2-17030FA |
| 141 | 1K611-735 | 182 | 1K220-354 | 223 | 1K277-136 |
| 145 | 1K120-304 | 183 | 1K130-496 | 224 | 1K277-139 |
| 148 | A2-14025FA |  | 1K130-504 | 225 | 1K681-480 |
| 149 | 1K240-469-1 | 184 | S1-02000FA | 226 | 1K681-481 |
| 150 | 1K601-180 | 185 | 1K260-612 | 228 | A2-17035FA |
| 151 | 1K681-479 | 186 | 1K260-613 | 229 | 1K371-709 |
| 152 | B1-20040FB | 187 | 1K220-357 | 230 | B1-14030FA |
| 154 | 1K117-406 | 188 | 1K225-231 | 232 | 1K371-710 |
| 155 | A2-20040FT | 189 | 1K611-720 | 235 | 1K611-750 |
| 156 | 1S424-033 | 190 | 1K260-622 | 239 | 1K133-085 |
| 157 | 1S422-054 | 191 | 1K611-737 | 240 | 1K060-058 |
| 158 | 1K010-002-1 | 192 | 1K630-793 | 241 | B2-20050FA |
| 159 | B1-20055FR |  | 1K630-817 | 242 | 1K050-367 |
| 160 | 1K370-028-3 |  | 1K630-818 | 243 | 1K116-450 |
| 161 | 1K625-059 | 193 | 1K521-165 |  | 1K116-451 |
| 164 | 1K277-134 | 194 | 1K641-177 |  | 1K116-452 |
| 165 | 1K371-707 | 195 | 1K130-208 |  | 1K116-453 |
| 166 | H1-17030FA | 197 | 1K611-738 |  |  |

# 部品対照表　Parts Reference Table

| 補助番号 Auxiliary No. | 部品番号 Part Number | 補助番号 Auxiliary No. | 部品番号 Part Number | 補助番号 Auxiliary No. | 部品番号 Part Number |
|---|---|---|---|---|---|
| 244 | 1K130-328 | 291 | 1K120-009 | 331 | 1K117-563 |
| 245 | 1K117-410 | 292 | 1K120-368 |  | 1K117-564 |
| 246 | 1K130-497 | 293 | 1K630-805 |  | 1K117-565 |
| 247 | 1K230-391 | 294 | K2-20025FA |  | 1K117-566 |
| 248 | 1K130-498 | 295 | B2-17040FA |  | 1K117-567 |
| 252 | K2-17035FB | 297 | A1-17025FT |  |  |
| 254 | 1K681-468 | 298 | 1K120-300 |  |  |
| 255 | 1K120-264 | 301 | 1K600-045-1 |  |  |
| 256 | B2-20040FA | 302 | 1K042-001 |  |  |
| 257 | B1-20050FA | 303 | 1K370-114 |  |  |
| 258 | A2-17045FA | 304 | 1K681-482 |  |  |
| 259 | B1-17055FT | 305 | 1K161-159 |  |  |
| 260 | 1K120-231 | 306 | 1K117-437 |  |  |
| 261 | A2-14025FC | 307 | 1K001-003-1 |  |  |
| 262 | 1K681-464 | 308 | 1K120-369 |  |  |
| 263 | 1K681-465 | 309 | 1K601-187 |  |  |
| 264 | 1K120-012 | 310 | 1K117-440 |  |  |
| 266 | H1-17040FA | 311 | 1K117-525 |  |  |
| 267 | 1K601-174 | 312 | 1K117-526 |  |  |
| 268 | 1K601-175 | 313 | 1K117-413 |  |  |
| 269 | 1K087-411 | 314 | 1K117-462 |  |  |
| 270 | U2-06310SX | 315 | 1K641-181 |  |  |
| 271 | 1K681-466 | 316 | 1K611-746 |  |  |
| 272 | 1K611-827 | 317 | 1K611-745 |  |  |
| 273 | 1K467-154 | 318 | 1K611-744 |  |  |
| 274 | 1K206-096 | 319 | 1K601-176 |  |  |
| 275 | 1S700-343 | 320 | 1K220-369 |  |  |
| 276 | 1K240-832 | 321 | 1K116-626 |  |  |
| 277 | K2-17020FB | 322 | 1K050-411 |  |  |
| 278 | A1-17025FA |  | 1K050-407 |  |  |
| 279 | A1-14028FA | 324 | 1K681-539 |  |  |
| 280 | B1-20040FA | 325 | 1K117-485 |  |  |
| 281 | 1K120-015 | 327 | 1K117-228 |  |  |
| 282 | 1K120-195 | 328 | 1K117-527 |  |  |
| 284 | 1K120-142 | 329 | 1K050-282 |  |  |
| 288 | B1-17035FA | 330 | 1K130-238-1 |  |  |
| 289 | 1K010-150 |  |  |  |  |
| 290 | 1K600-764 |  |  |  |  |

## 部品対照表 Parts Reference Table

| 補助番号 Auxiliary No. | 部品番号 Part Number | 補助番号 Auxiliary No. | 部品番号 Part Number | 補助番号 Auxiliary No. | 部品番号 Part Number |
|---|---|---|---|---|---|
| B19 | 1B610-119 | B1001 | 1B060-501 | | |
| B21 | 1B300-024 | B1003 | 1B060-505 | | |
| B23 | 1B314-138 | B1004 | 1B060-506 | | |
| B27 | 1B002-043 | B1005 | 1B060-507 | | |
| B31 | 1B570-074 | B1006 | 1B060-508 | | |
| B33 | 1B574020-4 | B1028 | 1B999-530-1 | | |
| B35 | 1B002-034 | | | | |
| B69 | 1B400-085 | | | | |
| B71 | 1B240-094 | L1 | 1B027-072 | | |
| B82 | 1B001-661-1 | | | | |
| B86 | 1B002-025 | | | | |
| B109 | 1B240-091 | | | | |
| B121 | 1B260-101 | | | | |
| B136 | 1B002-026 | | | | |
| B154 | 1B999-529 | | | | |
| B210 | 1B060-521 | | | | |
| B211 | 1B999-527 | | | | |
| B220 | 1B060-517 | | | | |
| | | | | | |
| B33 | 1B999-534 | | | | |
| | 1B999-535 | | | | |
| | 1B999-536 | | | | |
| | 1B999-537 | | | | |
| | 1B999-538 | | | | |
| | | | | | |
| | | | | | |
| Z25 | 1B100-634 | | | | |
| Z43 | 1B100-635 | | | | |
| Z49 | 1B100-633 | | | | |
| Z93 | 1B100-038-4 | | | | |
| Z193 | 1B999-528 | | | | |
| | | | | | |
| | | | | | |
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| | | | | | |

組立図 Construction of the Lens

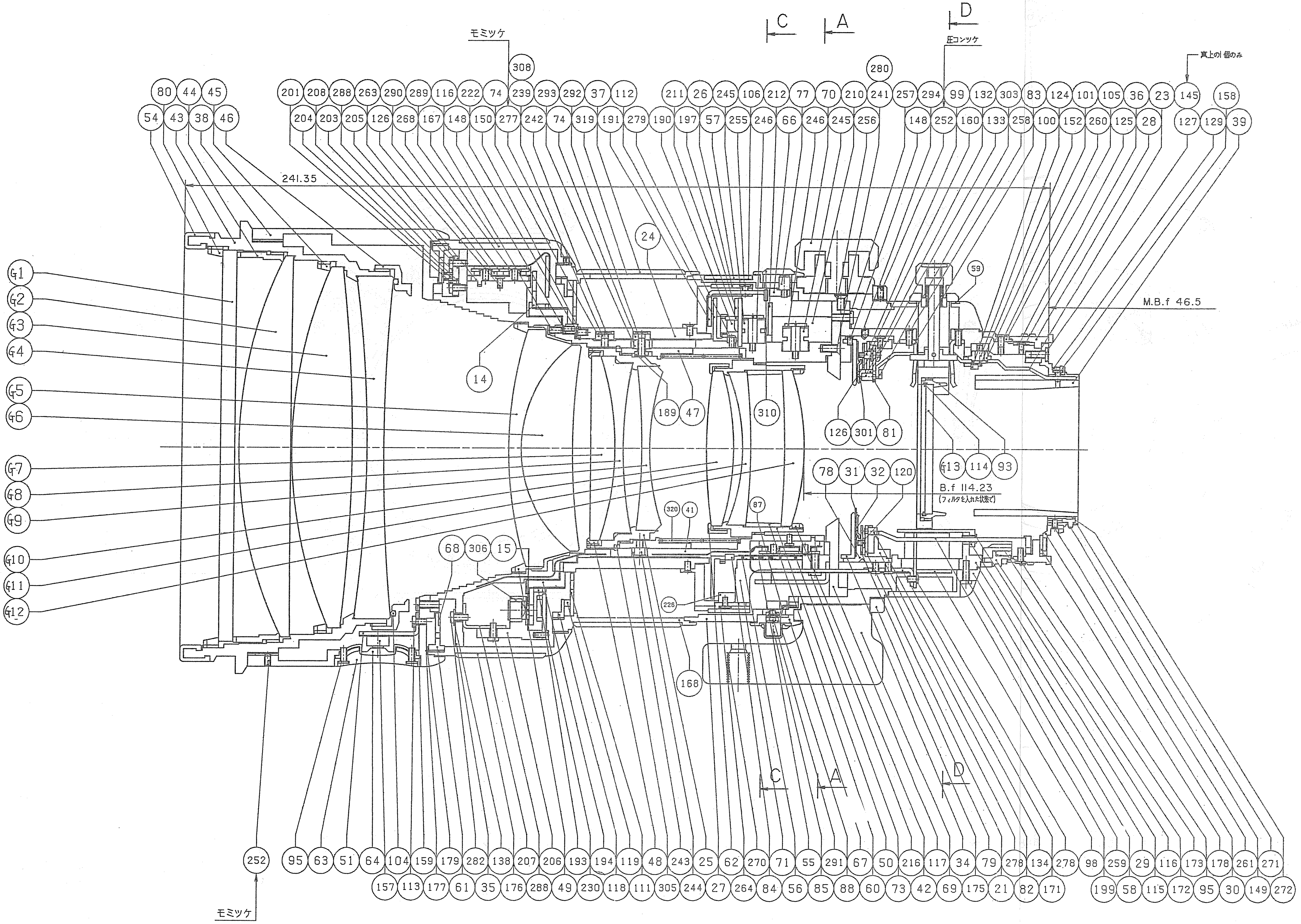
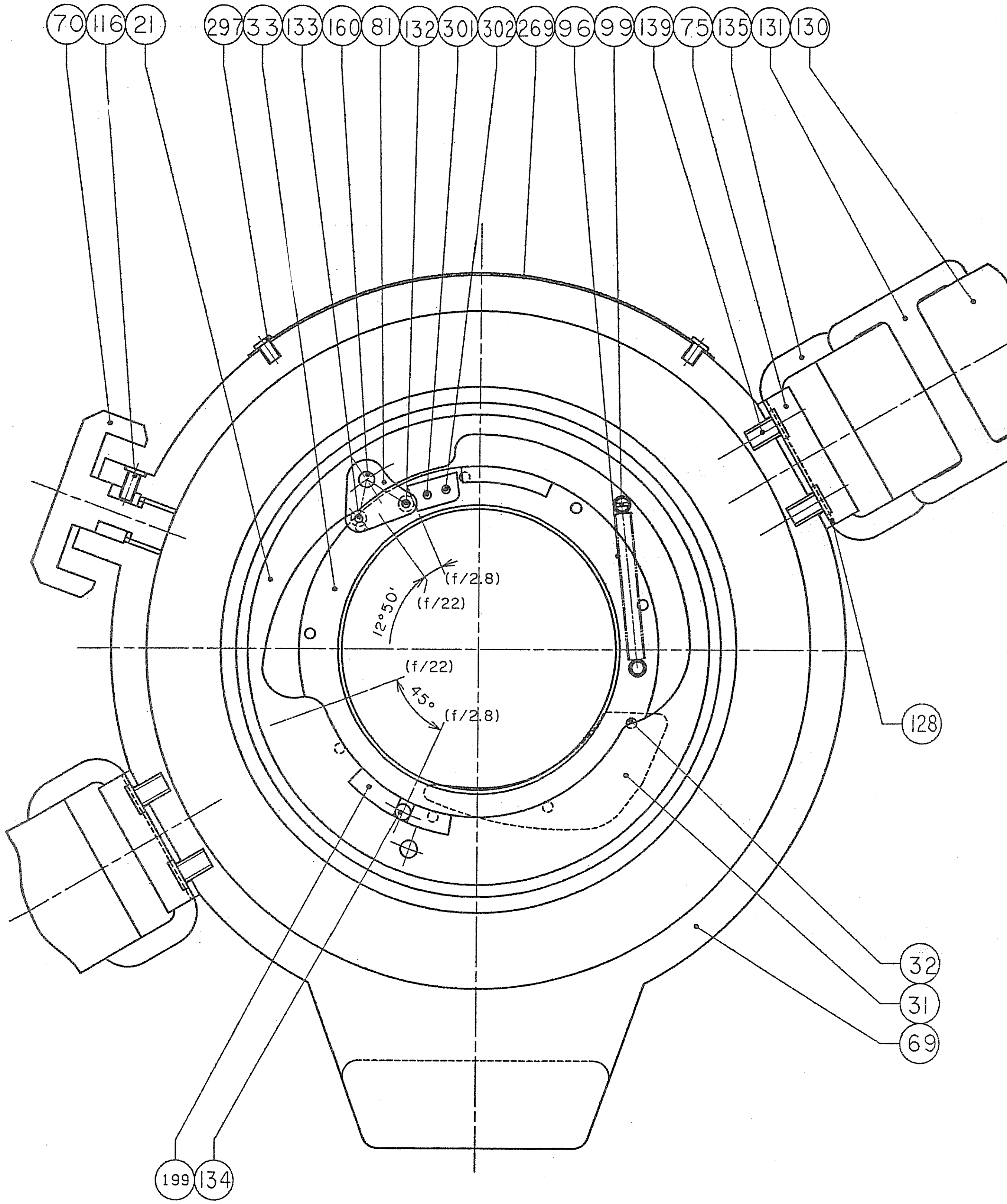
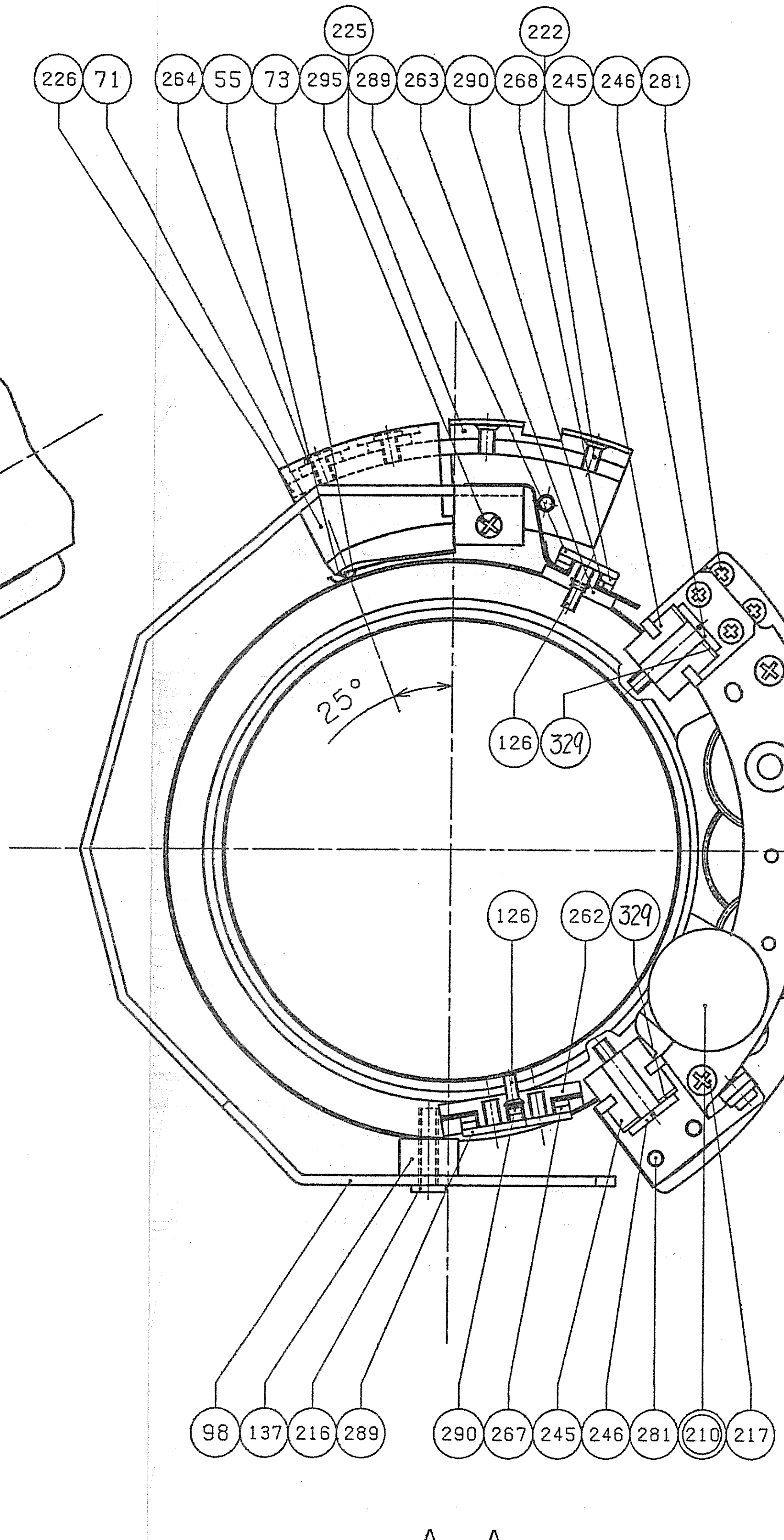
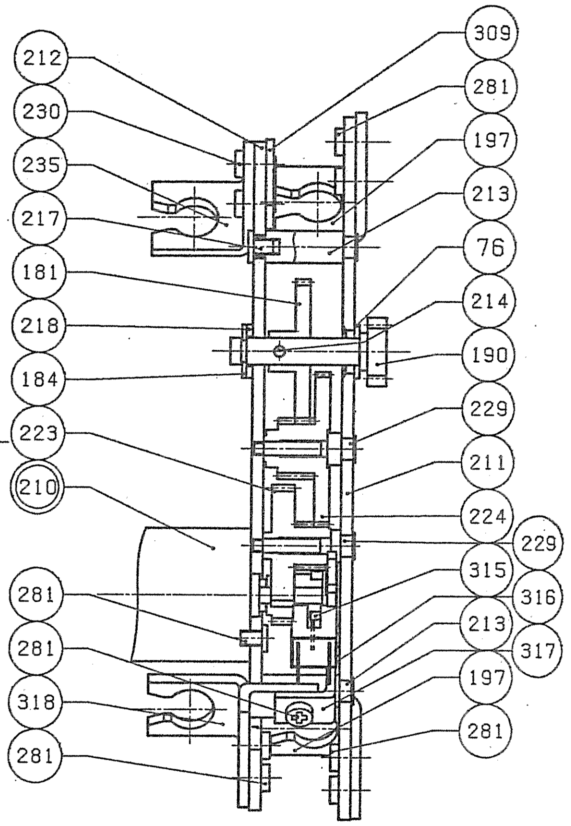

モミツケ
308
C
A
D
圧コンツケ
280
真上の1個のみ
80 44 45
54 43 38 46
201 208 288 263 290 289 116 222 74 239 293 292 37 112
204 203 205 126 268 167 148 150 277 242 74 319 191 279
211 26 245 106 212 77 70 210 241 257 294 99 132 303 83 124 101 105 36 23 145 158
190 197 57 255 246 66 246 245 256 148 252 160 133 258 100 152 260 125 28 127 129 39
241.35
24
59
M.B.f 46.5
G1
G2
G3
G4
G5
G6
G7
G8
G9
G10
G11
G12
14
189 47
310
126 301 81
G13 114 93
78 31 32 120
B.f 114.23
(フィルタを入れた状態で)
320 41
87
68 306 15
226
168
C
A
D
252
モミツケ
95 63 51 64 104 159 179 282 138 207 206 193 194 119 48 243 25 62 270 71 55 291 67 50 216 117 34 79 278 134 278 98 259 29 116 173 178 261 271
157 113 177 61 35 176 288 49 230 118 111 305 244 27 264 84 56 85 88 60 73 42 69 175 21 82 171 199 58 115 172 95 30 149 272

Fig. 4


70
116
21
297
33
133
160
81
132
301
302
269
96
99
139
75
135
131
130
(f/2.8)
(f/22)
12°50'
(f/22)
45°
(f/2.8)
128
32
31
69
199
134


225
222
226
71
264
55
73
295
289
263
290
268
245
246
281
25°
126
329
126
262
329
98
137
216
289
290
267
245
246
281
210
217

A-A

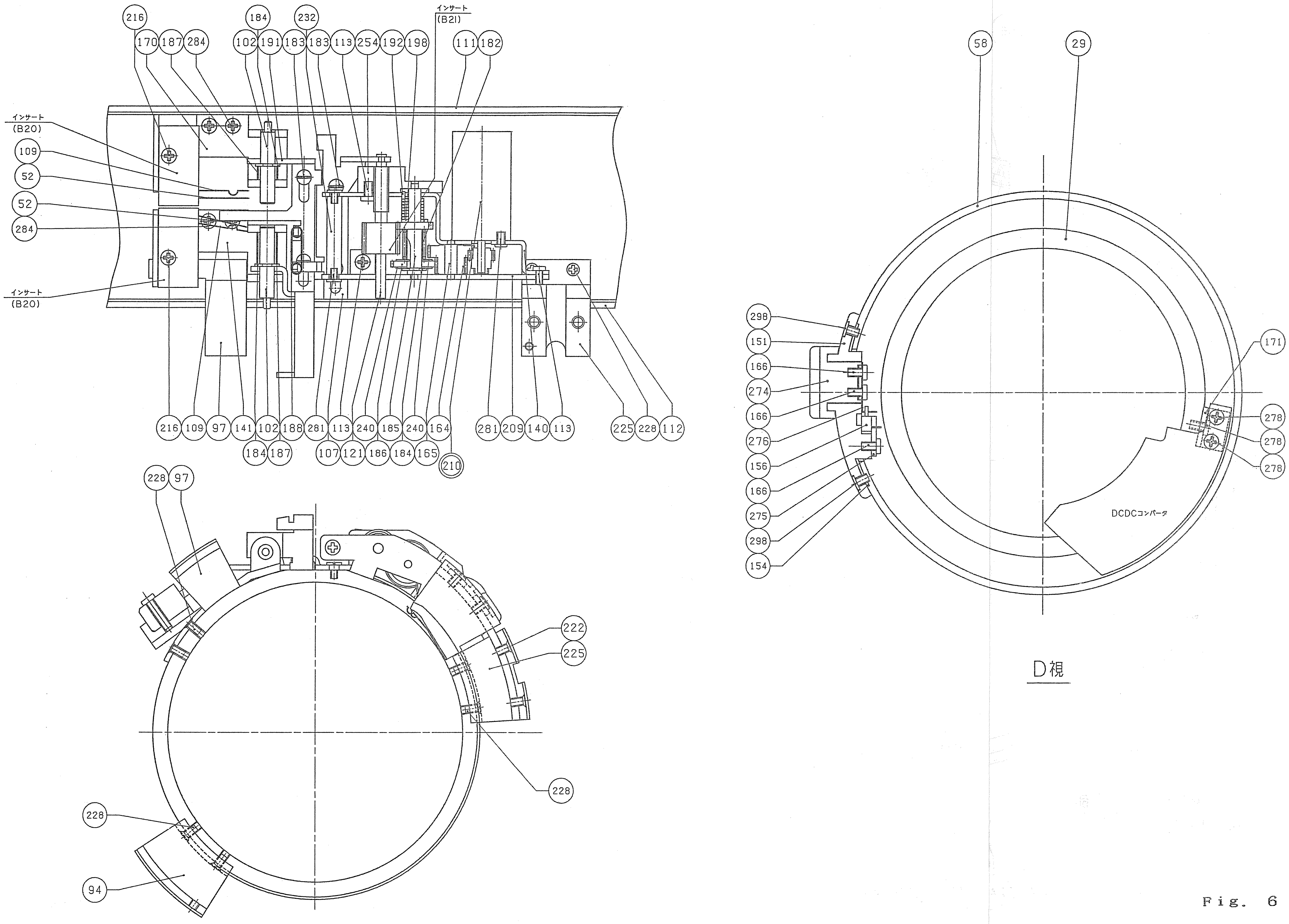

212
230
235
217
181
218
184
223
210
281
281
318
281
309
281
197
213
76
214
190
229
211
224
229
315
316
213
317
197
281

絞り部及び三脚座部(後方より)

**Note)** When ordering the repair parts, please use the parts numbers stated on the Repair Parts Lost. Please note that some of those numbers stated on the Parts Number Reference Table, the Exploded Drawings and the Lubricant and Binding Agent Chart are not included in the Repair Parts List since they are not available as the individula repair parts.

**注）** 部品対照表、組立図、接着給油図には部品要求出来る番号と要求出来ない番号と記載されています。
部品要求の際は、部品表で確認の上、要求して下さい。
部品表に記載されていない部番は部品要求出来ません。

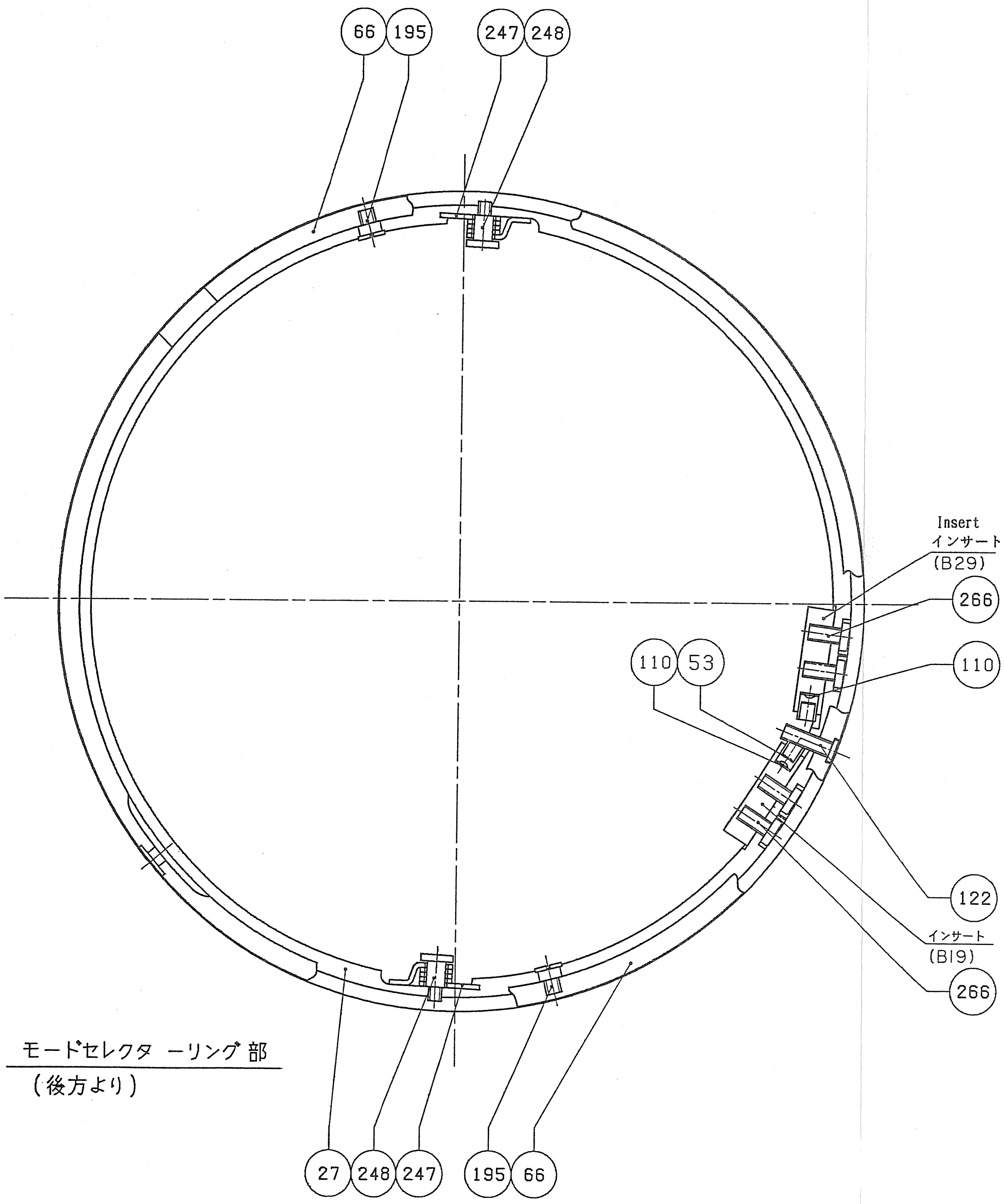
Fig. 5


インサート
(B21)
インサート
(B20)
インサート
(B20)
DCDCコンバータ

C−C

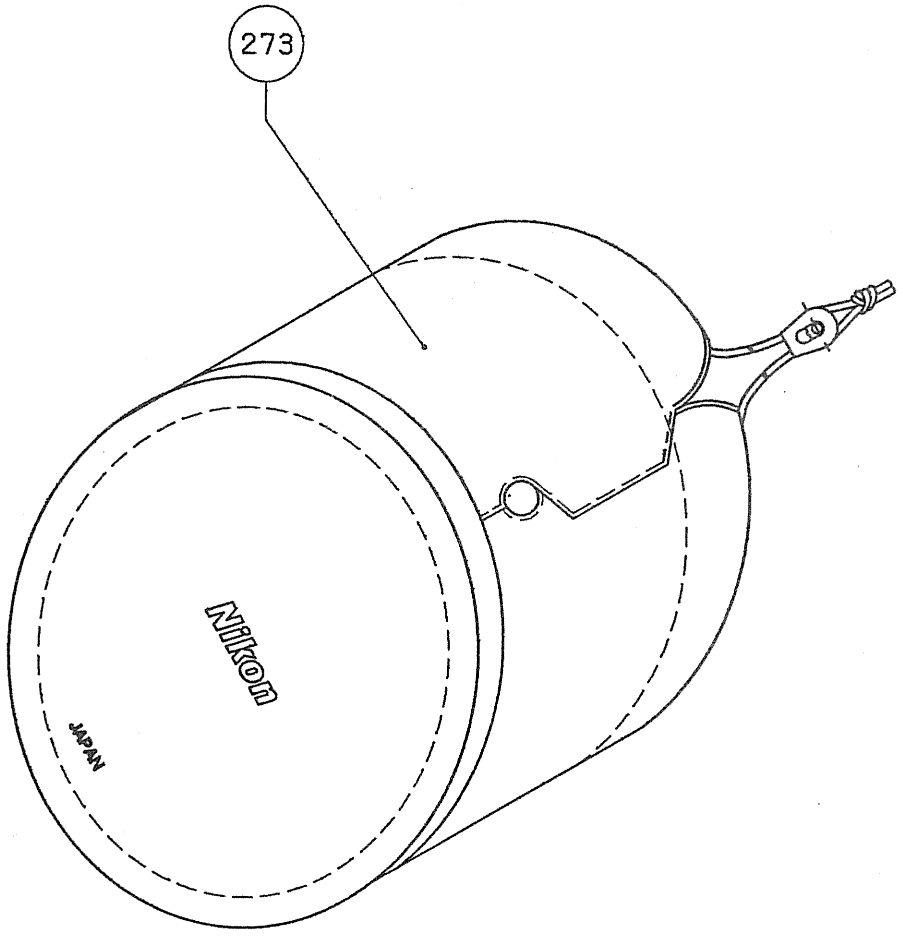
D視

Fig. 6


66
195
247
248
Insert
インサート
(B29)
266
110
53
110
122
インサート
(B19)
266
27
248
247
195
66

モードセレクタ ーリング部

（後方より）


273
Nikon
JAPAN

(1:2)

Fig. 7

## 接着給油図
## Lubricant and Binding Agent Chart

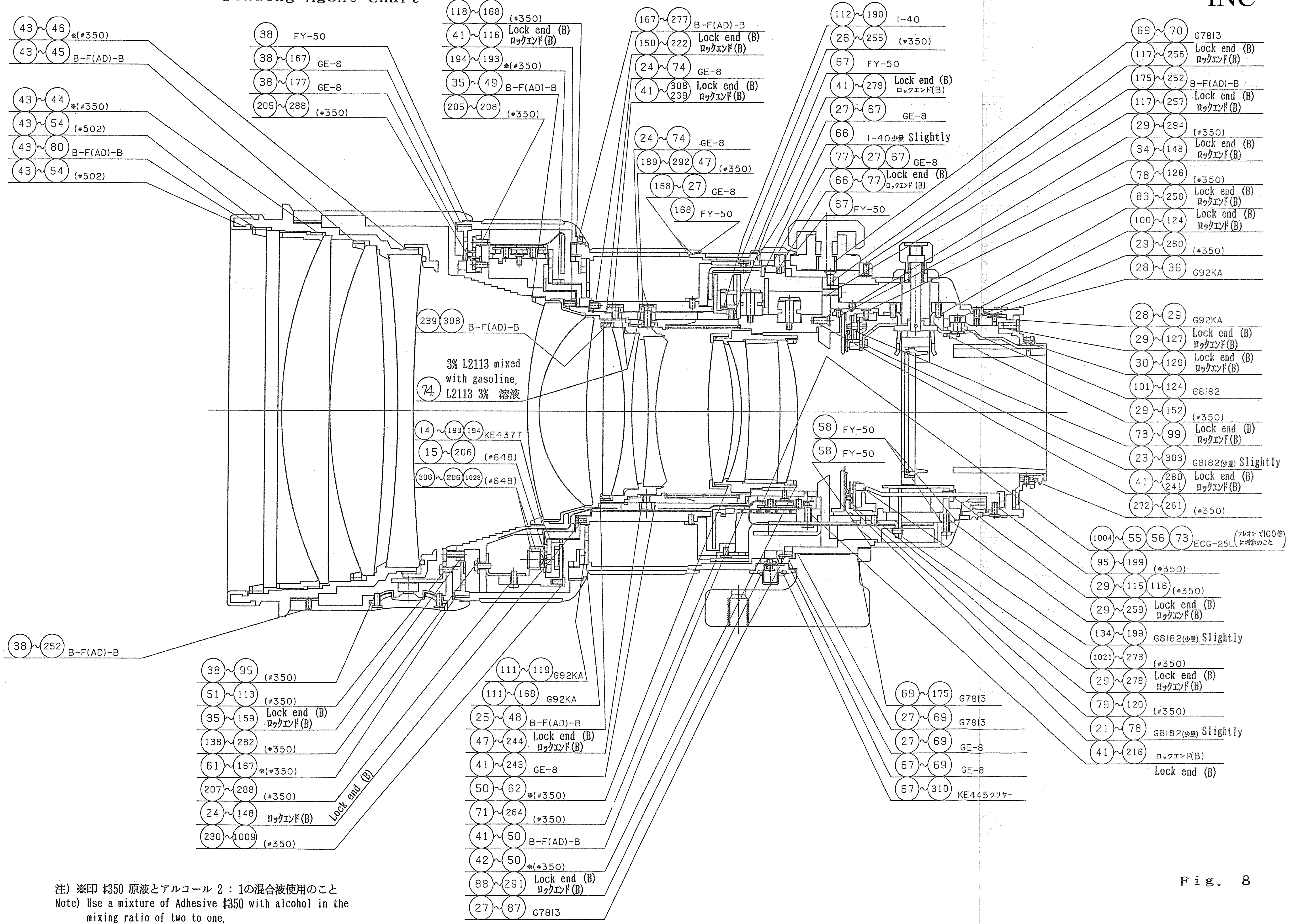
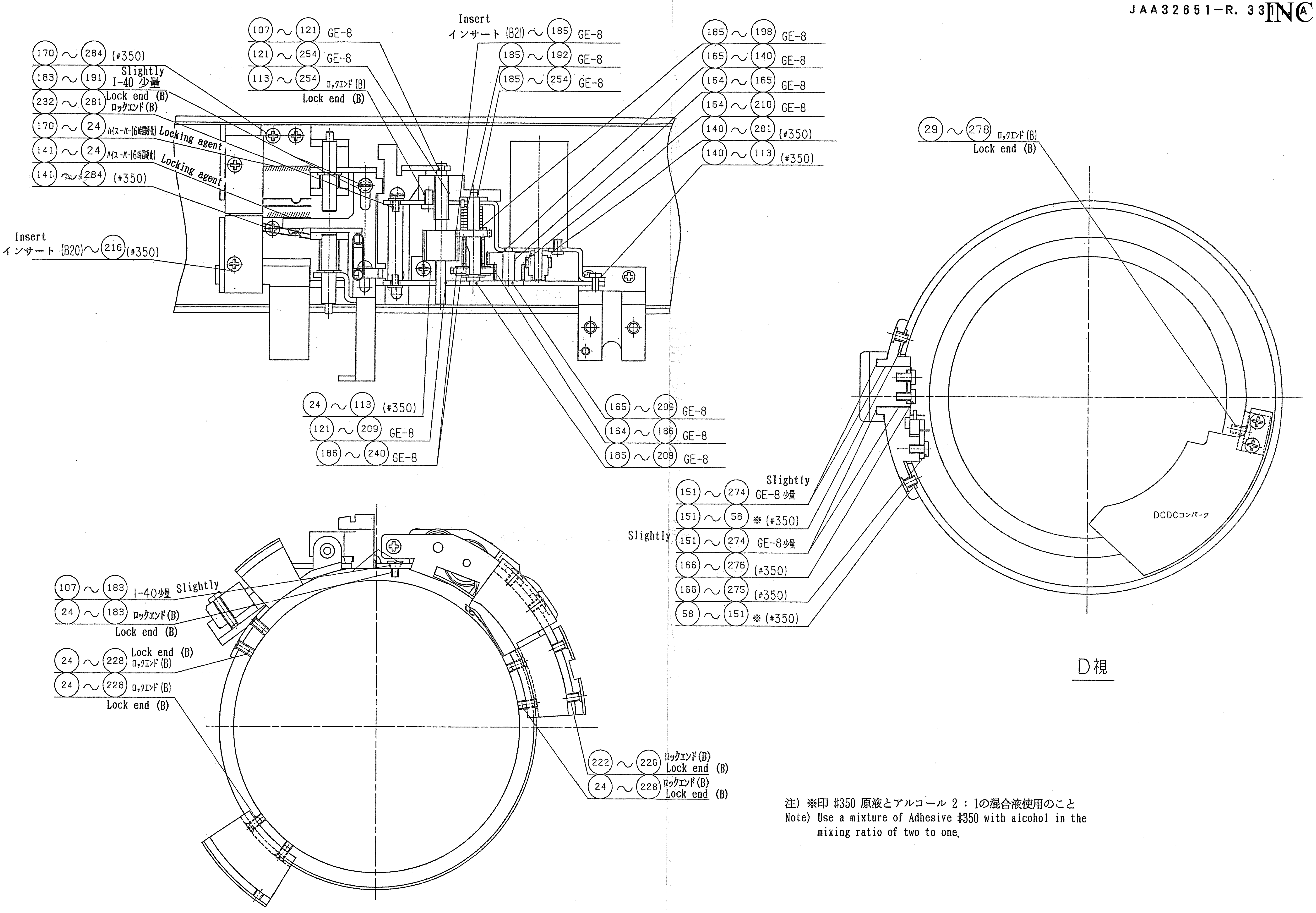

43~46 ※(#350)
43~45 B-F(AD)-B
43~44 ※(#350)
43~54 (#502)
43~80 B-F(AD)-B
43~54 (#502)
38 FY-50
38~167 GE-8
38~177 GE-8
205~288 (#350)
118~168 (#350)
41~116 Lock end (B) ロックエンド(B)
194~193 ※(#350)
35~49 B-F(AD)-B
205~208 (#350)
167~277 B-F(AD)-B
150~222 Lock end (B) ロックエンド(B)
24~74 GE-8
41~308 239 Lock end (B) ロックエンド(B)
24~74 GE-8
189~292 47 (#350)
168~27 GE-8
168 FY-50
112~190 I-40
26~255 (#350)
67 FY-50
41~279 Lock end (B) ロックエンド(B)
27~67 GE-8
66 I-40少量 Slightly
77~27 67 GE-8
66~77 Lock end (B) ロックエンド(B)
67 FY-50
69~70 G7813
117~256 Lock end (B) ロックエンド(B)
175~252 B-F(AD)-B
117~257 Lock end (B) ロックエンド(B)
29~294 (#350)
34~148 Lock end (B) ロックエンド(B)
78~126 (#350)
83~258 Lock end (B) ロックエンド(B)
100~124 Lock end (B) ロックエンド(B)
29~260 (#350)
28~36 G92KA
28~29 G92KA
29~127 Lock end (B) ロックエンド(B)
30~129 Lock end (B) ロックエンド(B)
101~124 G8182
29~152 (#350)
78~99 Lock end (B) ロックエンド(B)
23~303 G8182(少量) Slightly
41~280 241 Lock end (B) ロックエンド(B)
272~261 (#350)
1004~55 56 73 ECG-25L (フレオン で100倍に希釈のこと)
95~199 (#350)
29~115 116 (#350)
29~259 Lock end (B) ロックエンド(B)
134~199 G8182(少量) Slightly
1021~278 (#350)
29~278 Lock end (B) ロックエンド(B)
79~120 (#350)
21~78 G8182(少量) Slightly
41~216 ロックエンド(B) Lock end (B)
239 308 B-F(AD)-B
3% L2113 mixed with gasoline.
74 L2113 3% 溶液
14~193 194 KE437T
15~206 (#648)
306~206 1028 (#648)
58 FY-50
58 FY-50
38~252 B-F(AD)-B
38~95 (#350)
51~113 (#350)
35~159 Lock end (B) ロックエンド(B)
138~282 (#350)
61~167 ※(#350)
207~288 (#350)
24~148 ロックエンド(B)
Lock end (B)
230~1009 (#350)
111~119 G92KA
111~168 G92KA
25~48 B-F(AD)-B
47~244 Lock end (B) ロックエンド(B)
41~243 GE-8
50~62 ※(#350)
71~264 (#350)
41~50 B-F(AD)-B
42~50 ※(#350)
88~291 Lock end (B) ロックエンド(B)
27~87 G7813
69~175 G7813
27~69 G7813
27~69 GE-8
67~69 GE-8
67~310 KE445クリヤー

Fig. 8

注）※印 #350 原液とアルコール 2 : 1の混合液使用のこと
Note) Use a mixture of Adhesive #350 with alcohol in the mixing ratio of two to one.


(170) ～ (284) (#350)
(183) ～ (191) Slightly I-40 少量
(232) ～ (281) Lock end (B) ﾛｯｸｴﾝﾄﾞ(B)
(170) ～ (24) ﾊｲｽｰﾊﾟｰ(6時間硬化) Locking agent
(141) ～ (24) ﾊｲｽｰﾊﾟｰ(6時間硬化) Locking agent
(141) ～ (284) (#350)
Insert インサート (B20) ～ (216) (#350)
(107) ～ (121) GE-8
(121) ～ (254) GE-8
(113) ～ (254) ﾛｯｸｴﾝﾄﾞ(B) Lock end (B)
Insert インサート (B21) ～ (185) GE-8
(185) ～ (192) GE-8
(185) ～ (254) GE-8
(185) ～ (198) GE-8
(165) ～ (140) GE-8
(164) ～ (165) GE-8
(164) ～ (210) GE-8
(140) ～ (281) (#350)
(140) ～ (113) (#350)
(24) ～ (113) (#350)
(121) ～ (209) GE-8
(186) ～ (240) GE-8
(165) ～ (209) GE-8
(164) ～ (186) GE-8
(185) ～ (209) GE-8
(107) ～ (183) I-40少量 Slightly
(24) ～ (183) ﾛｯｸｴﾝﾄﾞ(B) Lock end (B)
(24) ～ (228) Lock end (B) ﾛｯｸｴﾝﾄﾞ(B)
(24) ～ (228) ﾛｯｸｴﾝﾄﾞ(B) Lock end (B)
(222) ～ (226) ﾛｯｸｴﾝﾄﾞ(B) Lock end (B)
(24) ～ (228) ﾛｯｸｴﾝﾄﾞ(B) Lock end (B)
(29) ～ (278) ﾛｯｸｴﾝﾄﾞ(B) Lock end (B)
DCDCｺﾝﾊﾞｰﾀ
Slightly
(151) ～ (274) GE-8 少量
(151) ～ (58) ※ (#350)
Slightly
(151) ～ (274) GE-8少量
(166) ～ (276) (#350)
(166) ～ (275) (#350)
(58) ～ (151) ※ (#350)

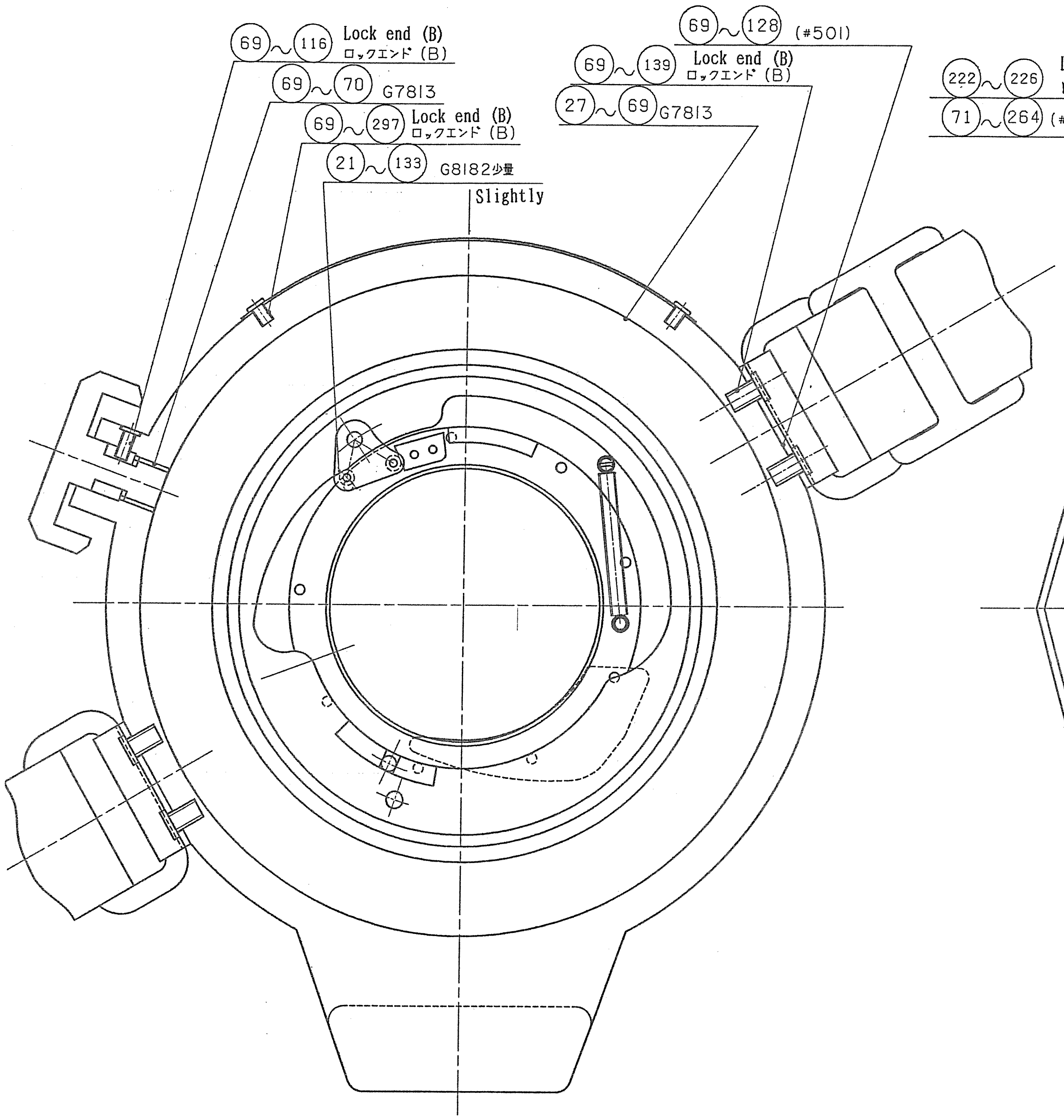
D視

注）※印 #350 原液とアルコール 2：1の混合液使用のこと

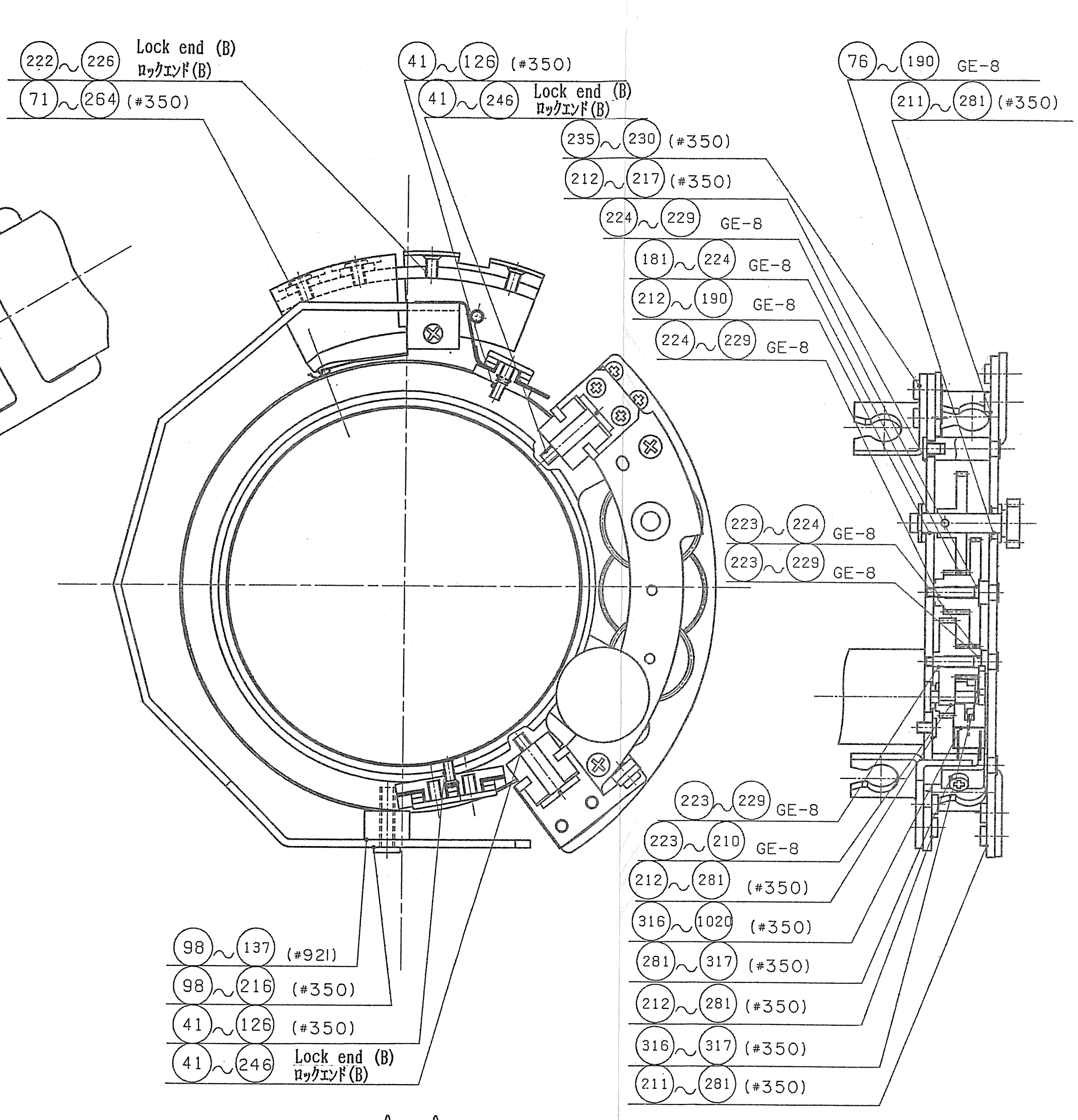
Note) Use a mixture of Adhesive #350 with alcohol in the mixing ratio of two to one.

C－C

Fig. 9


69～116 Lock end (B) ロックエンド (B)
69～70 G7813
69～297 Lock end (B) ロックエンド (B)
21～133 G8182少量
Slightly
69～128 (#501)
69～139 Lock end (B) ロックエンド (B)
27～69 G7813

絞り部及び三脚座部(後方より)


222～226 Lock end (B) ロックエンド(B)
71～264 (#350)
41～126 (#350)
41～246 Lock end (B) ロックエンド(B)
235～230 (#350)
212～217 (#350)
224～229 GE-8
181～224 GE-8
212～190 GE-8
224～229 GE-8
76～190 GE-8
211～281 (#350)
223～224 GE-8
223～229 GE-8
223～229 GE-8
223～210 GE-8
212～281 (#350)
316～1020 (#350)
281～317 (#350)
212～281 (#350)
316～317 (#350)
211～281 (#350)
98～137 (#921)
98～216 (#350)
41～126 (#350)
41～246 Lock end (B) ロックエンド(B)

A－A

Fig. 10

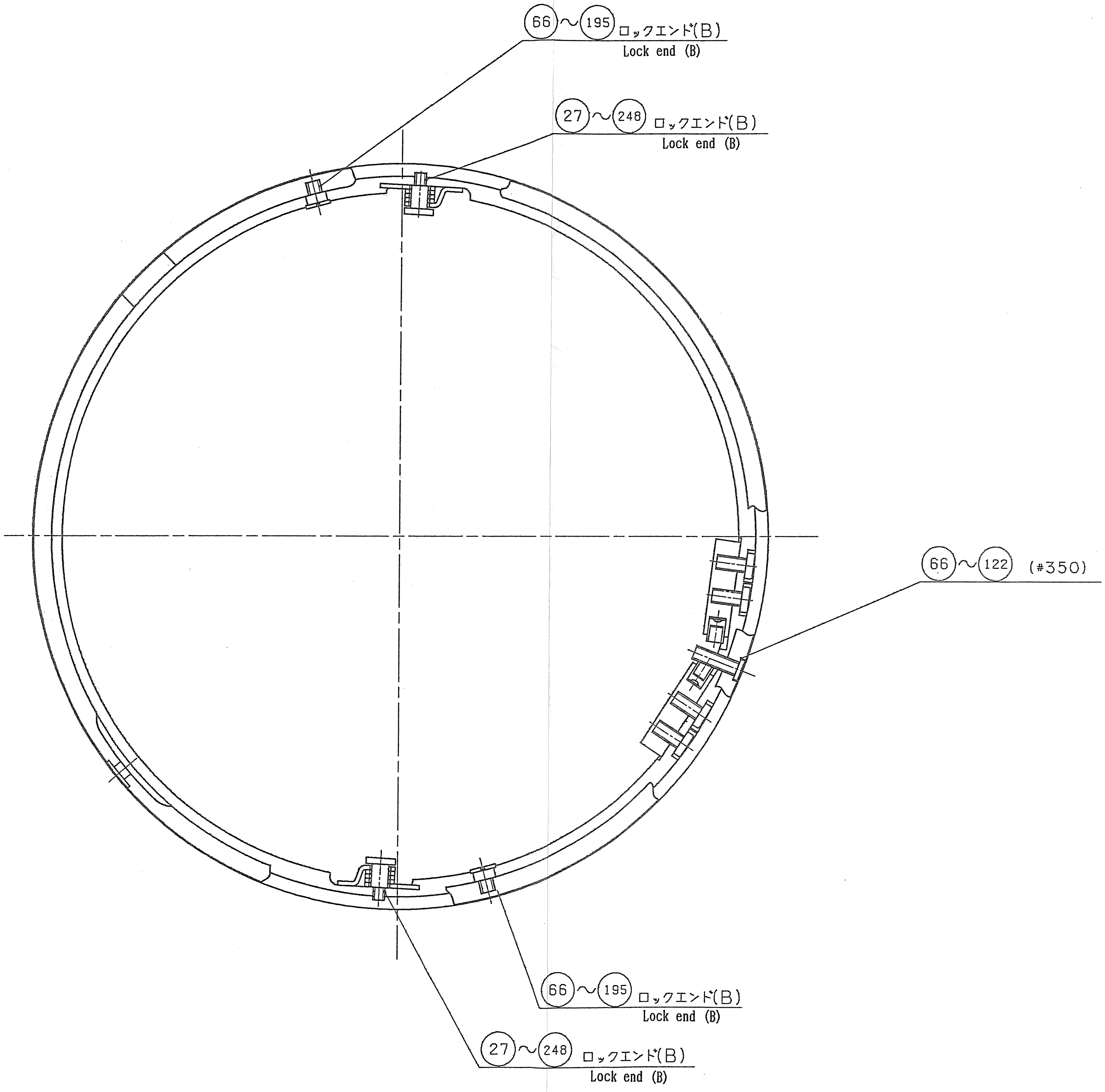

66～195 ロックエンド(B)
Lock end (B)
27～248 ロックエンド(B)
Lock end (B)
66～122 (#350)
66～195 ロックエンド(B)
Lock end (B)
27～248 ロックエンド(B)
Lock end (B)

Fig. 11